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BID-ASK SPREAD IN FINNISH HOUSING MARKETS

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ABSTRACT

The main objective of this study is to first of all answer the question of how the market participants in Finland have seen the pricing of housing from different perspective than previous studies by studying how much the asking price differs from the bidding price in the Finnish housing markets. Secondly this research departs from past studies concerning the Finnish housing market liquidity by examining reflect of spread between the listing and contract prices to market liquidity.

Housing market data comprises of the list prices and actual contract prices of dwellings in Helsinki Metropolitan area including Espoo and Vantaa and also cities of Turku, Tampere, Oulu, Jyväskylä, Joensuu and Vaasa are included. The observation period is from January 1, 2005 to December 31, 2012. The list prices of houses were gathered from one of the biggest open market database portals in Finland and the actual contract prices were collected from Statistics Finland database. The content of both databases are based on the information of housing transactions provided by real estate agents.

First this research results showed that housing market bid-ask spread was statistically significant across time in whole observation period in all studied market areas. There can thus be seen differences between different housing types. Overall the difference in list and transaction prices was – 10.3 percent and condominiums accounting -12.5 percent bid-ask spread. Second, in all market areas the liquidity was studied to affect to housing bid-ask spread. Correlation between dwelling time on the market and bid-ask spread was however slightly positive. Third, the Helsinki metropolitan area housing market was studied to capture more positive correlation between bid-ask spread and housing time on the market.

KEYWORDS: housing price spread, housing markets, housing bid-ask spread

1. INTRODUCTION

Discussions about housing markets appear almost daily in the media and press in all over the world and in most countries. The common factor to these discussions is that they revolve around individuals' experiences and frequent conversations between these individuals are often held around dinner tables, elevators and in public transport. So the housing market speculation is pleasurable for the whole nation in every country and each individual is the best housing market analyst.

Almost in all situations of exchange of services or products a rational buyer sets his bid price after having assessed all relevant factors affecting to the value of the subject of matter. In the housing markets regardless of country the important attributes affecting to final or contract price are such as size, location and condition of the dwelling. This is partially the reason for so many individual analysts in housing markets because where the publicly traded company's financial information is available to the public the information concerning of housing share is not generally available. The above-mentioned factors are so important and affecting that it would be almost impossible for example from Sweden to forecast the contract price of the dwelling sold in Bangkok without knowing the area or country at all let alone the subject of a home´s condition.

In spite of the problems related to predictability of the housing markets and housing prices the forecasting housing market business cycles across borders is very popular. This cross-border oriented research results accuracy should therefore be called into question. This concern rose when the Dutch Deutsche Bank announced in July 2012 that then Finnish current housing prices overvaluation were 21 percent (Kammonen 2012). Due to the severity of foreign housing market predictability this thesis examines the possible overvaluation of housing prices from other perspective by examining the spread between the asked price and the final price especially in the Finnish housing markets.

Although the housing markets are important and represent the market in which almost every single human being or at least large share of it has to do with, the statistics relating to the market are sparse and rarely comparable across countries. For example in the EU, in which one of its main tasks is in top level to harmonize the practices and customs, even the introduction of residential house prices into the one harmonized index of consumer prices seems to be almost an impossible task to implement.

1.1 Motivation and contribution

Studying the housing prices and the price formation in housing markets is important in two aspects: firstly the house prices and changes in housing market prices have a wide impact throughout the macro-economy and secondly the dwellings account for a majority of the households´ wealth and as a result the changes in housing prices significantly affect to household consumption. Often the dwelling is the largest acquisition in the person´s life, so large that the capital to the purchase of a dwelling is often necessary to borrow. Due to this fact the sudden price collapse in housing markets could drive the mortgage holder into unfavorable distress and in that situation the banks would also have to carry out the heavy loan losses in the form of asset write-downs.

In addition to the fact dominant position of housing as a good and an asset for the wider macroeconomic the reason to pursue this study is another fact that trends in residential housing prices really matter. The pivotal role played by housing markets and housing wealth in many worldwide recessions has been scientifically proven (Leamer 2007: 4). For example the role played by housing markets in the so-called "Great Recession" and in previous cycles has convinced many economists that understanding housing is central to understanding business cycles (Leamer 2007: 4).

The thesis contribution is in opening the functioning of the Finnish housing markets and to first time discloses the amount what buyers in the housing markets have been able to bargain from the list price of the dwellings. The role of the media in raising the awareness of the housing market price formation can considered to be great because from different medias mainly television has been the end media channel in this case and this has led to information increasing in the housing markets. The housing markets can then say to meet at least semi-strong forms of the efficient market hypothesis. Internationally and also in Finland the reality television has shaped the housing markets to more transparent and many consumers have become more familiar with some real estate agencies methods to price the properties and this may have resulted so that people have become more price sensitive in housing markets than before. This may also be reflected to the results obtained from this research so that the housing bid-ask spreads can be larger especially in the Helsinki metropolitan area from approximately 2009 onwards.

At the same time with media visibility the housing markets have also been a great target

market to internet visibility. The growth of the Internet has generated significant new sources of information generally and especially from the perspective of the housing markets. Good examples in Finland are websites Oikotie.fi, Jokakoti.fi, Etuovi.com and nettiasunto.com few to mention. Internationally the same situation is in U.S. (craiglist.com), Germany (immobilienscout24.de), UK (rightmove.co.uk) and Belgium (immoweb.be). Both in Finland and in other countries these mentioned sites are in the top websites in their own countries. Despite the huge potential provided by the information in housing markets the literature exploiting and studying the housing pricing factors and effects is still in its early stages.

1.2 The structure of the thesis

This thesis is structured as follows. The first chapter introduces the reader to the topic and the purpose and contribution what there is behind this research. The second chapter goes through the previous studies concerning the thesis topic. The earlier studies are shown in relation to subject and presented in chronologic order. The fourth and the fifth sections present the theoretical background of the research topic and familiarize the reader to the key words in all aspects. The sixth section describes the methodology which is used in assessment of the data underlying the empirical section of the research. The seventh chapter shows the results derived from data and empirical studies. The section eight concludes the study and the research final conclusions and proposals for the future research are reviewed.

2. PREVIOUS STUDIES

The literature concerning the comparing list and sale prices in housing markets or in residential property is in its early stages. This research appears to be the first paper to compare the list and transaction price datasets in Finnish housing markets. It can also be concluded that information or data of list housing prices has previously been difficult to handle though because no party has not been documented the list housing prices before the entry of the internet. The actual or contract price of houses and property has been provided by Statistics Finland and its data related to housing prices have been used widely in Finnish studies for example in Einiö, Kaustia & Puttonen (2007: 4) study.

Even if the research topic is in its infancy in Finland there is however to some extent results from studies abroad. Most of the housing market-oriented research has studied the housing market liquidity. In these studies the liquidity has been measured in terms of time-on-the-market and the studies have explained the time-on-the-market in terms of property characteristics and measures of market conditions. The previous studies have been analyzed in this section so that the first part handles this perhaps the most studied subject in the housing markets and the second set analyses the studies concerning the effects to housing bid-ask spread.

2.1 Studies dealing with housing Time on the Market

One of first research to study the time on the market as a critical dimension in housing markets was Belkin, Hempel, and McLeavey (1976). The research used a multidimensional segmentation of housing markets in studying the significance of time on the market. Belkin et al. (1976: 1) described the housing time on the market as "the time a house remains on the market". The more precise description to time on the market was the time from first listing to first deposit receipt, so the actual sales situation served as an end point of the time on the market. The other option would had been the time when the seller drags the dwelling off sale, but of course in this situation if the buyer for some reason would back off from trade the dwelling should be quickly back on sale so this is the reason why off sale was out of the question. By using these defining's the Belkin et al. (1976: 1) study examined the time on the market as a measure of product attractiveness and submarket performance and therefore according to Belkin et al. (1975: 2) the time on the market should be seen as a measure of value

for housing. Belkin et al. (1976: 1) note that the house features use in regression analysis to predict time on the market should be unsuccessful because if two houses are identical and equally priced with comparable demand and supply, then the dwellings should remain on the market for the same duration. The same time on the market would also be in question even though the two dwellings are not identical but are made identical by price.

Belkin et al. (1976: 4) study covered over 1 000 transactions in 1970-1973 from U.S. based city Hartford. Hartford is based in state of Connecticut. The research data included the date of initial listing, receipt of deposit and sale, physical characteristics of property, price at initial listing and at sale and coded identification of town. Despite the research cropping the data also made it possible to define time on the market as the time from listing until the closing of the sale. As mentioned earlier the Belkin et al. (1976) research although chosen the receipt of deposit as a time on the market end point. The research data showed for example that single-family houses time on the market in Hartford Metropolitan area were 5.47 weeks in 1970 and 4.38 weeks in 1973. The range however was from less than one day to more than two years but distribution skewedness was towards shorter time periods.

Belkin et al. (1976: 18) draw a several conclusions relating to housing market behavior from their study. The time on the market first of all pointed out to be an important descriptor of market behavior. By conclusion Belkin et al. (1976: 18) state that it would be good to list the brokers in relation to market performance on time on the market, because the longer the time on the market of brokered apartments the poorer the performance of the broker, saying that the time on the market is easy indicator to judge the broker firms performance. The longer time on the market periods should reveal the errors in list pricing so the brokers access to real-time information of time on the market would improve the pricing skills and knowledge of real estate brokers. However the research showed that in Hartford area the large percentage of apartments and properties were sold close to list price and within a short time on market, meaning that the brokers have had made a good job in period under research.

Belkin et al. (1976: 18) found the time on the market to be exponentially distributed, signifying that the time to deposit e.g. sale of the property followed a random process. So all properties that were properly priced had equal probability of sale in the next week regardless of how long they had been on the market. This result indicated that time on the market is not predictable with house features. House features cannot be used to

predict the time on the market, because the time on the market can only be predicted by property price.

Finally Belkin et al. (1976: 18) found some housing attributes to be correlated with longer time on the market periods. The significant positive correlations to be overpriced were found in properties which offered more space. The final conclusion was that the larger the list price/selling price gap is the longer the average time on the market.

Another early study relating to time on the market aspect in housing markets was made by Miller (1978). Miller (1978: 2) study primarily was an analysis of the tradeoff between selling time and price meaning that according to the study the seller has two somewhat conflicting objectives: to maximize selling price and to minimize the used selling time. In addition to Belkin et al. (1976) Miller (1978: 2) starts by stating to Belkin et al. study results that the seller must to some degree overprice the property when selling it in order to preclude the possibility of missing a potential highest bid because sellers are not able to see the distribution of potential bids.

Miller (1978: 4) capsulizes the function of property values to three sets of variables according to earlier studies:

1) Direct bundle of housing services
2) Financial conditions
3) Market transaction factors

The first set of functions is related to site, location and improvements. Second variable the financial conditions such as interest rate may of course affect to housing markets. The final set of housing transaction factors include the methods and process by which exchange of property is facilitated. According to Miller (1978: 5) most published studies by 1970 had concentrated on the first set variables by studying the influence of physical characteristics to property values. Also the location factor had been studied a lot. These both were also subject in Belkin et al. (1976) study. The financial conditions had in previous studies until then been assumed stable.

The sample data in Miller (1978: 6) consisted of 91 observations of single family property in the latter half of 1976 in Columbus, Ohio. The data were collected from Realtor Multiple Listing Service Data and by direct survey in Columbus Metropolitan area. The properties used in the study were selected from a relatively small geographical

area in order to avoid vast locational differences. The collected data included in addition to selling price and date the listing price and date, physical characteristics, site and location. As the selling date Miller (1978: 5) used the signing of the purchase which is in terms a bit different than what Belkin et al. (1976) used but actually is the same timing because in different cities the different practices and standards are used in the housing sale process.

Miller (1978: 8) divided the study sample data to three price range groups: under 40 000$, 40 000$-69 999$ and 70 000$. The sample observations were divided to sample groups so that the low price range group included 37 observations from 91 observations total full sample. Mid price range group accounted 28 observations and the high price range group contained 26 housing sales. Only the full sample model resulted in a significant regression on time on the market. This outcome gave some support to the result that there is a positive relationship between selling price and time on the market. In examining the average time on the market the results indicated that the higher priced properties generally required more time on the market.

In the study Miller (1976: 7) developed an inflationary index based on construction cost indexes to help to control the inflationary price effect and to develop a deflated selling price. The construction cost index reported by U.S. Department of Commerce was modified by local factors for the Columbus Ohio area. In his study Miller (1976: 7) used this technique although admitted that both the procedure and the appropriate index for deflation were somewhat arbitrary and that there was a risk that the used method would raise to be a debatable issue. The entire sample deflation index averaged nearly eight percent on an annual basis. The model showed some decline in the regression on time on the market and therefore demonstrated a positive inflation bias of approximately thirty-seven percent (Miller 1978: 7).

Miller (1978: 9) study results showed that the general mean time on the market trend line is a good approximation of the Columbus Ohio housing market in 1976 indicating that at each price level (low, medium and high) there may be a normally distributed variation for selling time. Miller (1978: 10) states as a final caveat that other factors such as broker skill, intensity of promotion and advertising may enter into the determination of both selling price and time on the market and the results demonstrated must be avoided in studying more complex area of housing market operation, because the housing market transaction process touches the human behavior and the field of psychology.

The more recent research concerning the study of time on the market in housing markets is Kluger and Miller (1990) study. With the exception to other studies Kluger and Miller (1990: 1) uses more characteristics than only time on the market to discover the full market value of property. In their paper Kluger and Miller (1990: 1) construct a measure of housing liquidity based on the relative odds ratio. The odds ratio is a relative probability of sale for any two houses at a particular instant in time. For example if odds ratio between a house in question and a "typical house" equals two, then the house of interest would be twice as likely to sell as the "typical" house in any point in time.

According to Kluger and Miller (1990: 4) there is many other factors than price that may affect to the liquidity of property and that is why in their research the proportional hazards model is developed. The proportional hazards model is based on the Cox proportional hazard technique that is a widely used statistical model in the epidemiologic and social sciences. For example biostatisticians use the model to look at survival rates following various treatments for diseases such as cancer. Kluger and Miller (1990: 4) list the advantages to use the proportional hazards (PH) model instead of the sale time: firstly the PH model is semi-parametric and it can accommodate censored data. For example the properties that have not sold during the data collection period were censored because the actual sale is not known and additionally properties withdrawn from the market had censored also. The time on the market is thus central to the proportional hazards model because it is a part of the hazard function.

In construction of the liquidity measure Kluger and Miller (1990: 8) use many property attributes to measure the house liquidity. Attributes such as lot size, square feet of living area, number of bedrooms and baths and property age were used to determine liquidity function. In the example presented by Kluger and Miller (1990: 9) listing the house in the spring or summer accounted the expected longer time on the market. The results showed on the contrary that for example an additional bedroom increased the sale probability on any given day to 1.47 times what the sale would have been without the extra bedroom. This 1.47 can be thought as a measure of the liquidity added by an extra bedroom. But of course because the expected time on the market is lower for the house with an extra bedroom the odds ratio alone does not provide enough information to compute the expected time on the market. The estimate requires the hazard function. For example in this extra bedroom case Kluger and Miller (1990: 13) found that median home expected sale time reduces by nine days.

Kluger and Miller (1990: 14) proposed liquidity measure is useful and easy to interpret but the researchers warn using the hazard estimates when evaluating pricing effects because it does not make sense to apply the PH estimate to house with an asking price far away from its market value. Kluger and Miller (1990: 17) found that house priced 1 000$ less than its market value had an odds ratio of 0.98. Correspondingly a house priced 50 000$ below market price had an odds ratio of 0.55. The odds ratio is in this case clearly too high because the houses in the sample on average sell for 60 000$ and therefore this would mean the sale of the house for 10 000$.

2.2 Studies concerning the list and transaction prices of housing

Along with the time on the market another and more important line of research concerning the housing or properties markets is the research line concerning the list and transaction prices of condominiums or properties. The study concerning research of list and transaction prices in housing markets is still in its early stages and the research focuses mainly to U.S. housing markets although there are a handful of studies oriented to other countries. In Finland the studies are concentrated to research transaction prices development in housing markets and usually when speaking of housing market price movements the studies or economic reviews denote transaction prices when discussing of housing prices in general. The research concerning of list prices of houses is non-existent in Finland.

One example of a study oriented to U.S. housing markets is Genesove & Mayer (2001) study concerning and analyzing the loss aversion and seller behavior. Genesove and Mayer (2001: 24) showed that an index of median list prices is likely to suffer from further biases as compared to one based on median transaction prices. Loss aversion means that many sellers are reluctant to realize a loss on their house. Especially during the market downturn the seller usually makes the previous selling price as a topic when discussing with the broker of selling the property.

Genesove and Mayer (2001: 26) results show that there is cyclicality in housing markets in aspect of bid-ask spread and that relationship between list prices and transaction prices is not constant over the house price cycles. As mentioned in the introduction section the basic assumption is that in housing markets the expected transaction price would be below list prices. However, Genesove and Mayer (2001: 26) research accounted that the magnitude of the discount could vary with the price cycle. In a

particularly hot properties market, condominiums may transact at prices higher than the list price which is against a general presumption. Vice versa in a sharply falling market, transaction prices may be substantially lower than list prices due to sellers' aversion of possible loss and the fact that seller knows that many listed properties do not sell so the information has psychological effects on the sellers behavior.

Genesove and Mayer (2001: 10) quarterly data covered the years 1990-1997 and the target market were Boston in U.S. The number of observations was 5 792 and the transactions were collected from a well-defined and geographically segmented market area in downtown Boston. The data provided the date of entry to the market and exit, the listing price on the day of entry, the type of exit and the sale price.

What is particularly interesting in Genesove and Mayer (2001: 16) study is that they are able to split the sample of transactions to those made by investors and those made by home-owners. The separation of the two groups is wise because a relatively large investor might calculate the loss on entire portfolio of houses or even entire portfolio of investment assets and vice versa while the home owner are thinking of course the same but from another aspect and different feeling because it is one's home so perhaps the psychological pain of selling a home exceeds that of selling a mere investment. Genesove and Mayer (2001: 17) results rejects the null hypothesis that these two groups would behave the same. The loss coefficient for investors is statistically significant and indicates that investors still raise asking price by about one-quarter of their prospective loss. Investors also were observed to set slightly lower asking prices than owner-occupants.

Summarized in the nutshell the Genesove and Mayer (2001: 24) study showed that sellers subject to losses are to:

1. set about 25-35 percent higher asking price than what original purchase price was
2. attain about 3-18 percent higher selling prices
3. avoid the loss realization

Genesove and Mayer (2001: 25) research also gives a few explanations to understanding the real estate markets better and answers why real estate markets differ from perfect asset markets. The fact that the transaction prices are set by seller indicates that the market is far from being a perfect asset market. The second explanation to the

question of housing markets characteristics is that volume falls when prices decline. According to Genesove and Mayer (2001: 26) this phenomenon cannot be explained by perfect asset models but in their research they showed in the paper that both loss aversion and equity constraints are present and can explain this phenomenon. The findings also indicate that the housing markets are more cyclical than they seem.

One of the first outside of the United States oriented studies was Bourassa et al. (2008). The objective of Bourassa et al. (2008: 1) study was to compare the Swiss house prices indexes published by the Swiss National Bank (SNB) to hedonic indexes based on sale prices for the period from 1985 to 2006. The Swiss house prices index is constructed using medians of list prices as published in newspapers and on the internet. The index published by the SNB is calculated by Wüest and Partner (W & P) and on average from 100 000 to 500 000 list prices are used annually to calculate the median list prices. In the study the comparing of list prices to indexes constructed using the hedonic method was done for both single-family houses and condominiums. The hedonic method that Bourassa et al. (2008: 7) used is widely known technique to control for the heterogeneous nature of properties when constructing transaction-based house price indexes.

Bourassa et al. (2008: 10) found by using data gathered from Switzerland that list price indexes exhibited a different price path from hedonic indexes based on residential transactions. The Bourassa et al. (2008: 13) evidence points to a shifting relationship between list price and sale price depending on the position in the cycle and supports the hypothesis that sale price is more volatile than list price. The results by Bourassa et al. (2008: 10) suggest that such relationships were likely to vary over time.

Bourassa et al. (2008) study suggested that the relationship between list and transaction prices could vary over time but did not amplify the extent of these differences. Bourassa et al. (2008: 13) also were of the opinion, that list price indexes have a tendency to over-state price changes.

While the large part of all studies concerning real estate markets research is directed to U.S. the part of the studies studying property markets outside U.S. are directed to Ireland or to UK. This is because of the attractiveness of the Irish property markets for research due to Irish property bubble in late 1990s and early 2000s which led to the downturn in late 2007 and ultimately the bigger crash in 2009. In addition to the Irish attention there has also been interest in the study to Ireland's neighbor Scotland real

estate markets research. These UK oriented studies include for example: Levin & Pryce (2007), McGreal, Brown and Adair (2010) and Lyons (2013).

Levin and Pryce (2007: 1) study simulation model concentrated to the analysis of a hypothetical database of 30 000 house valuations with a mean of 100 000£. Although some examples in the study were extracted from Scotland cities Edinburgh and Glasgow property markets for taking support and trying to find the answer to extreme buyer side bids in housing markets. Researchers also interviewed real estate specialist for the study in order to get a better picture from the property price formation.

Levin and Pryce (2007: 10) define an extreme did as: "The bid that is drawn from the section of the upper tail of the distribution of potential bids that lies above the 95th centile – that is, one that is in the top 5 per cent of bids that the population of potential buyers would offer for a given property". Levin and Pryce (2007: 13) simulations suggest that the difference between the distributions of the mean and maximum bids increases as the number of bids per auction increases.

Levine and Pryce (2007: 16) research proposes a simple statistical explanation for the phenomenon of extreme bids. The statistical explanation states that in the boom period, compared to stable environment where the sellers' asking price usually serves as the maximum bid when there is so called single-bidder period, the market regime however switches to multiple-bidder when markets are overheating and bids per auction increases also the maximum bid increases and hence in the multiple-bidder environment the sale price is thus the maximum bid. The above mentioned explanation of Levine and Pryce (2007: 16) is consistent with professional valuer confusion about the correct valuation during the boom.

One of the first researchers to study the Irish real estate markets after the property markets crash in Ireland in 2009 was McGreal, Brown and Adair (2010). McGreal et al. (2010: 1) study utilizes quarterly transaction-based information on house prices from the Belfast Metropolitan Area to explore how the difference between the sale price and list price of houses varies across the market cycle.

In McGreal et al. (2010) study the information is structured on a time series basis and the transaction data is of the housing market in Belfast Northern Ireland over the period from 2002 to 2008. McGreal et al. (2010) study analysis is concerned with the mean differences between list price and sale price, the standard deviation of the differences,

the skewness and kurtosis of the distributions. McGreal et al. (2010: 1) study in particular seeks to investigate how prices vary over the cycle and whether these prices distributions depart or conform from normal distribution.

McGreal et al. (2010: 4) found that bid-ask spread is narrow in the so called normal housing market conditions with bidding price slightly greater than asking price. According to McGreal et al. the normal market conditions prevailed in 2002-2005 in Belfast. In the up-cycle periods the sale price increasingly exceeds the list price with the divergence widening when going deeper into overheating market conditions. In the down-cycle the situation is very different and then list price exceeds sale price supporting the contention that sellers try to maintain value in the down-cycle through list prices higher than sale prices. The result supports the hypothesis that sale price is more volatile than list price.

In their study McGreal et al. (2010: 6) found evidence to Levin and Pryce (2007) results indicating increasing divergence of sale price above and away from list price during boom conditions. In McGreal et al. (2010: 6) study the divergence started in 2005 and continued to the second quarter of 2007 and after that the bid-ask spread started to narrow. Up-cycle involves increasing bid-ask spreads as speculative behavior drives the sale price upwards but list price is slower to react to changed market conditions.

McGreal et al. (2010: 9) finally concludes the study by stating that the difference between quarterly means of bid and ask observations (bid-ask spread) showed to be substantial, + 12.1 percent on the up-cycle and -8.6 percent on the down-cycle.

The more recent housing market bid-ask spread study research is Lyons (2013) research from Ireland residential property markets during the period 2001-2012. Lyons (2013: 1) study examined for example issues of how legitimate is it to use asking price information in the absence of transaction prices and how the bid-ask spread does vary over the market cycle. Lyons (2013) study connects up two seemingly contradictory pieces of perceptions about the housing market: List prices are a lead indicator of transaction prices and in a downturn, sale prices will be below list prices.

In the research Lyons (2013: 10-11) uses two datasets. The datasets are The Central Bank of Ireland (CBI) dataset that includes information for over 600 000 loans on 475 000 properties and Daft.ie dataset. Daft.ie has been the largest property website in Ireland and the dataset covered 692 000 prices. Research method for studying above

mentioned pieces consists by using these two population-level datasets for Ireland to link list and transaction prices via four spreads: Selection spread, Matching spread, Counter-offer spread and Time-to-drawdown spread.

Lyons (2013: 34-35) concludes that of these above mentioned four spreads, the matching spread accounted for the largest proportion of the gap between sales and list prices. Another key finding was that while properties sold for less than their list price, new listings actually led transaction prices so there where seen so called loss aversion and the fact that the current list price levels serve as a good benchmark for price setting. Evidence from Lyons (2013) study suggested also that even in extreme market conditions list prices capture bulk of trends in sale prices.

Although outside U.S. oriented studies are concentrated mainly to UK or Ireland due to their housing market nature in the recent past the fact is that the research of list and transaction prices of houses is in its infancy in Finland thus there can be found interesting and this research spanning study topics from Finnish housing markets as well. One study belonging to this category is Einiö, Kaustia and Puttonen (2007) study concerning the loss aversion of sellers in the housing markets.

Einiö et al. (2007: 4) study focused to Helsinki metropolitan area housing markets and studied the reluctance to realize losses in target markets. The study period was 1987-2003 and the data covered over 309.000 housing transactions respectively. The main research question in Einiö et al. (2007: 1) study was to find answer that whether the purchase price play important role or not. In their study Einiö et al. (2007: 19) found evidence of loss realization aversion in Helsinki metropolitan area housing markets. The study results in Einiö et al. (2007: 19) can be summarized as follows:

1. Selling an apartment at a loss is not likely in Helsinki metropolitan area
2. Selling the apartment exactly at the purchase price is more likely than selling it at small gain or loss
3. There was found stronger loss realization aversion among low-priced apartments
4. Loss realization aversion was also found to be strong on behalf of pricier apartments and investment apartments

The Einiö et al. (2007: 18-19) study findings were interesting but are mainly what the results were expected to be and that the market psychology especially in the form of

anchoring plays a big role in the case of this research topic. The fact that the low-priced apartment owner is unlikely to sell his/her apartment at loss is obvious. To be exact the loss realization aversion was presence in all apartment types but showed more unlikely in the case of low-priced apartments and pricier apartments. The reason for lower-priced apartment's sellers' loss realization aversion could be explained partly by the mortgage payments connected to apartment's owners. Especially when the self-financing share is small the owners can be tougher to stick to the objective to get at least the amount from sale what it is actually been paid from the apartment.

2.3 Overview of related studies

It cannot be made a different unambiguous and exhaustive matrix based on the previous studies because of their different nature and angle of approach to the studied subject. Making a chart based on the previous literature is also difficult because studies concerning the actual subject what this thesis is dealing - comparing list and sale prices in residential property - is in its infancy. It appears that this is the first study to compare relativities across list and transaction price datasets in Finnish housing markets. Also the primary focus of studies from outside Finnish housing markets has so far being in studying the variation over time e.g. constructing different house price indices rather than across space. Of course it is tempting to study the house price values and variance over time because the houses or condominiums mark a large part of people's wealth.

The housing market literature identifies a number of different ways in which the house price is formatted. The basic black and white pattern is that the seller choices the list price and then buyers make their offers or bids such as for example in the auction. However the choice of the price is not so simple or it can be said that the choice of the price is simple but the actual sale price what seller might get is very difficult to predict. The factors that affect to the seller received price of bid are for example: location of house, interest rates, incomes and wealth of the purchaser etc. (Ferrari & Rae 2011; Kivistö 2012; Levin & Pryce 2007).

3. RESEARCH QUESTIONS AND HYPOTHESES

Fisher (1912: 11) stated that the process of selling a house usually begins with the seller's determination of asking price. Seller often has an asking price, that is, a price at which he tries to sell the house and what is usually above the price of the actual sale. The process continues with the buyer and in the same way there is often a bidding price on behalf of a buyer, which is usually below the price of the actual sale. At the end of the process there is the actual sale price and the price of sale thus generally lies between the prices first bid on behalf of the seller and asked on behalf of the buyer. This simple statement serves as the basis of the first hypothesis which states:

> *H1: The actual sale price or contract price of dwellings is below the asking price in the case of every area under research, regardless of the type of housing*

The above mentioned spread between the asked or alternatively list price and the final or contract price in the market for any asset including the real estate is a measure of the liquidity of the asset. Bagehot (1971: 13) stated that the liquidity of a market is inversely related to the spread. Meaning that in very liquid markets like for example money markets, the spread is usually very small. The situation is very different in markets for more illiquid assets and this leads to the much larger spreads.

With the illiquidity there is also another feature in the markets that has proven to have impacts to the bid-ask spread. Time on the market is studied to be a measure of asset liquidity. In this context Munn (1991) states that the liquidity is the amount of time required to convert an asset into cash. Comparing the liquid asset markets like money markets to illiquid the time on the market usually is relatively shorter. For example in money markets or stock markets the time on the market can approach zero while in illiquid markets like real estate markets the time on the market is normally measured in week's or sometimes even in months. Presumably the so called quieter market areas in Finnish housing markets can suffer smaller amounts of buyers and thus dwellings time on the market can stretch and it can effect to the bid-ask spreads. This leads to the second hypothesis.

> *H2: The spread between list price and contract price of dwellings is larger in the areas where dwelling time on the market is longer*

Jud, Winkler and Kissling (1995) demonstrated the model of housing market spreads and tested the model using housing market data from Greensboro, North Carolina. This empirical model showed that housing market bid-ask spreads were positively related to prices and transaction costs and negatively associated with the standard deviation of prices. Since spreads reflect market liquidity, the model presented in Jud et al. (1995: 5) study suggests that liquidity is a function of transaction costs and market information. As the model was tested in Greensboro which is a about 277 000 inhabitants city, the same model could be used to study Helsinki metropolitan area housing market liquidity affects to the same area bid-ask spreads. The above speculation leads to the third and final hypothesis.

> *H3: In the Helsinki metropolitan area the dwellings bid-ask spreads reflect the market liquidity*

In addition to Jud et al. (1995) also Belkin et al. (1976) found that there is relationship between the time on the market and the bid-ask spread. The findings suggest that when there is lot of supply of housing compared to demand in the housing markets then the housing time on the market extends and the bid-ask spread also increases and the actual sale price moves further from the list price. Conversely when there is undersupply of condominiums in the markets compared to demand bid-ask spread narrows and the actual sale price may even exceed the condominium list price because the buyers are willing to buy the condominium at any point at almost any price and therefore to cross the possible counter offer.

4. PRICE FORMATION IN HOUSING MARKETS

The feature that effects to the price formation of housing is the fact that housing is distinguished from other economic commodities on behalf of several characteristics. There can be found at least five characteristics in housing that affects to house price formation and separates the housing from other economic commodities. (Quigley & Hårsman 1991: 2-3.)

1. Housing is a complex commodity
2. Housing is fixed in space
3. Housing is expensive to produce
4. Housing units have remarkably long lifetime
5. Housing is a necessity for any individual

First of all such as could not be imagined housing is complex commodity. Some may consider housing as a simpler commodity or asset class than for example a complex derivatives but the truth is different. The factors that make housing complicated to evaluate and therefore also complicated to price is that housing is complicated to produce and that a variety of different features must be gathered to evaluate a single dwelling or building. (Quigley & Hårsman 1991: 2.)

Second mentioned aspect relates to location of housing. The characteristic stating that "housing is fixed in space" relates to the fact that housing choice is usually also a choice of neighborhood, a choice of access to workplace, a choice of access to grocery, a choice of access to pharmacy or schools or other local services that need varies and depends often from the stage of life. (Quigley & Hårsman 1991: 2.)

The third characteristic states that "the housing is expensive to produce" and it is obvious because normally producing a house or building takes at least few months also from the professional man depending on the size of a construction but it can also take years if the target housing is complex and includes the small architectural details. Because housing is expensive to produce it is also expensive to buy housing that is produced by someone else and this fact makes renting a house a common form of tenure. Also due to its expensiveness, for homebuyers a mortgage repayment is an attractive alternative to immediate purchase against consumption of all savings. (Quigley & Hårsman 1991: 2.)

Even though housing units have remarkably long lifetime it is not so simple that if in a country or locality lives 5 000 inhabitants there would be 5 000 owner occupied homes available for the inhabitants whole lifetime. What about the new firms in that area, would those employees need a house to stay? What about the people, who doesn´t have a possibility to purchase a house? And, what if someone wants to move off to another area to live? This means that the construction of new houses or buildings provides only a small fraction of total quantity services supplied to consumption. (Quigley & Hårsman 1991: 2-3.)

The fifth characteristic relates to the fact that housing itself has not substitutes meaning that everyone needs to consume housing services no matter how poor people may be. Housing is therefore necessity for any individual to live a normal life. (Quigley & Hårsman 1991: 2-3.)

All of these above mentioned distinctive features affect to house market price formation but there are a few features in housing that reflects so substantially that it is important to handle these separately in next paragraphs. These attributes relates to the location of housing and the expensiveness of housing to produce.

4.1 On the impact of location to housing market price formation

It is apparent that there are differentials in price formation in housing markets within regions and between them. The links between local economies and local housing markets have been studied a lot and the strength of these links relating to difference between locations is more and better recognized. The market imperfections between and within different areas are mainly due to demand side actions. The demand in the housing markets thus drives the supply side. (Ferrari & Rae 2011: 36.)

The factors emerging from the demand side undermining the housing markets have been recognized to be for example: depopulation or inversely positive flow of migration or increased mobility, access to relatively cheap owner-occupation and simply local economic change. The cheap owner-occupation refers and is close to the financial side of the housing price formation but it belongs also to the location category. In some countries or locations the home prices have been studied to increase through policies called "Right to Buy" and this has been situation for example in Ireland in the mid-

2000s and in the U.S. in same period. The mortgages have been so easy to access in these locations that it has affected to the housing prices heavily. (Ferrari & Rae 2011: 31.)

Ferrari and Rae (2011) studied the impact of location to housing market price formation and they found that volatility in house prices have moved differentially in parts of the UK. UK´s housing markets provide fertile ground for this kind of study because the UK´s housing market is one of the most volatile in the world. UK housing market is also fertile because of the fact that the UK´s housing market is highly differentiated across space meaning that there are important regional and local differences that affect to the housing market price formation. By regional and local differences Ferrari and Rae refer to the social inequalities in the UK. (Ferrari & Rae 2011: 10.)

Ferrari and Rae (2011: 15) found that the long gap in house price differences between different regions in UK was explained by market fundamentals such as low level of supply, high levels of household growth, rising household incomes and the consolidation of the social and cultural position of owner-occupation. These all have pushed market prices up and increased disparity over time.

In their research Ferrari and Rae (2011: 19) showed the average sale price in different UK areas and locations. The study results showed that it can be seen that the period from 1970s and 1980s has been a period of temporal volatility and that the regional differentials in house prices has been modest. After 1980 the differences in the housing prices started to travel in opposite directions partly due to the government policies. The late 1970s slump coincided of monetarist policies the aim in for controlling inflation where Margaret Thatchers government was involved. The government measures emphasized the major role of the growth centers and these became more and more attractive. (Ferrari & Rae 2011: 14.)

The study also shows the example in UK relating to local variations on behalf of the larger regions but it is clear that there is also variation inside the localities. Britain is a good example in regional differentiation and there can be seen clear local variations within regions. The highest prices in London can be found in West London and other good examples from local differences are for example Leeds, Harrogate and York that creates the so-called "golden triangle". (Ferrari & Rae 2011: 23.)

Among with the location also the interest rates have been on the carpet also in

speculation of the house prices variation between locations and simply a rise in the prices. The effect of interest rates to housing prices changes is discussed in the next section.

4.2 Interest rates and increase in income levels affect to housing prices

When comparing the above mentioned house prices differences by region in UK in the late past to the same periods Bank of England base rates it is obvious that interest rates affect to housing prices in all regions housing markets where the Central Bank operates (Ferrari & Rae 2011: 16).

The latest boom-bust cycle in UK in from the beginning of 1990s to 2006 was fuelled by extraordinary low interest rates. Also the rise in interest rates in 1988 to 1990 can be seen in the housing markets as the smooth curve downward in house prices in all regions under investigation. (Ferrari & Rae 2011: 16.)

Although there are high inequalities between the UK cities and regions on behalf of incomes the interest rate decrease can affect to house price rises also in so called moderate income regions. In moderate income households regions the modest properties might be outbid by household's potential with cash or to mortgage. So due to increased leverage the high income or wealth households begin to focus their attentions on secondary-use residential property and the regions where moderate income households live the buy market changes to let market to households belonging to lower income categories. (Ferrari & Rae 2011: 16.)

Ferrari and Rae (2011: 17) show in their study further the development of the UK´s Bank of England interest base rate to demonstrate and point the above described situation where in low interest rates period the interest rates actually do not vary spatially but with economic prospects and ability to access debt finance can accelerate to uneven spatial outcomes in interest rates and vice versa in housing prices. (Ferrari & Rae 2011: 16.)

The general assumption is that when interest rates decrease the house prices rise, because of the nature of property as long lived asset and its expensiveness to produce. Vice versa when interest rates increase inversely house prices fall because price of the money is greater and fewer people can qualify for mortgages to buy a home and even if

higher income households would qualify to get mortgage they do not want to make higher payments because the monthly installment is greater. (Conerly 2012.)

The opposite opinion leans to the globalization of real estate markets and states that even if interest rates raise the house prices would also rise because in some part of the world the money is less expensive in terms of another Central Banks reference rate and house or building prices are relatively more expensive. So in this situation the capital flows to the place where it is more valuable and the purchasing power is greater. (Conerly 2012.)

Globalization can explain some of the rising house prices in the situation where interest rates also increases but the basic ratio to determine the under- or overvaluation of houses is also, in addition to other usable techniques, to compare the households income ratio to house price indices. Increase in housing prices is often supported and positively correlated with the growth in household disposable incomes. In uncertain situation in local economy where there is high level of unemployment and uncertain expectations to policy-makers and generally consumers have indulged to bad expectations for the state of the economy and their own future prospects. (Kivistö 2012: 23.)

Kivistö (2012: 22) described the index of prices for old apartments per square meter and the household's income index in 1983-2011 in Finland. The index indicating the relation of house prices to household incomes was in highest peak at the 1989 when there was extreme heat and turmoil in the Finnish property markets. After 1989 the relation of house prices to household incomes has remain steady and the increase has been stable in the Finnish markets. The basic message from the Kivistö (2012) study is however that house prices are in line with household usable incomes and there is notable regression between incomes and housing prices. (Kivistö 2012: 20.)

4.3 The formation of prices in the short and long term

The types of homes, condominiums and other properties sold at different times may vary and there exists many factors that affect to this varying or house price formation as discussed in previous sections. The factors affecting to long term price formation can be local or in broader scale macroeconomic. These local factors can be for example migration (positive or negative), loss or increase in jobs due to one or more of the major local firms or alternatively factor can be local income rising of course the increase in

household income can also be macroeconomic but these income reviews are usually due to the form of tax relief and normally speaking very slight. However the one significant macroeconomic factor affecting to housing prices has also been studied to be the interest rates. The interest rates connected to financial institutions loosened risk measurement methods for private households lending is the most significant studied factor to affect to the price formation in the short term. (Nagaraja, Brown & Wachter 2010: 2.)

As also discussed in earlier paragraphs housing is a very heterogenic as a commodity at least if we compare housing in between different areas also inside one country. Due to this heterogeneity housing prices may vary significantly between different areas and condominiums or properties' locating inside the same area are substitutes and hence does vary in the same direction and at same time. This is why it is difficult to compare the prices of housing in different regions with each other. Over the past few decades, a number of different methods to measure housing price changes have emerged as more people have looked to the housing market for investment opportunities. After the still partly ongoing sub-prime crisis, the investors have started to look cheap investment opportunities from property markets. We can say that after the current market collapse, which started from U.S. in mid-2007, housing indicators have become increasingly important in understanding how housing and property markets operate. (Nagaraja, Brown & Wachter 2010: 2.)

The ground-breaking work in the area of studying housing market price formation has done for example by Karl Case and Robert Shiller. Case and Shiller have studied the U.S. house price formation from many points of view and have for example compared U.S. house price growth with income growth since 1985 and conclude and confirms previously in this study mentioned fact that income growth explains nearly all of the house price increase for over 40 states. Case and Shiller have also developed a pioneering bunch of indices which includes, inter alia Case-Shiller Home Price Index, Composite 10 Index and Composite 20 Index, which are also respected by significant financial institutions in the U.S. The indices are published by Standard and Poors. The S&P/Case-Shiller Home Price Indices are designed to be a reliable and consistent benchmark of housing prices in the United States and therefore these indices have also been used in housing derivatives trading and among institutional investors. Case-Shiller indices are respected sources of formation of housing prices among investors looking for new investment opportunities in properties markets. The indices purpose is to measure reliably the average change in home prices in a particular geographic market.

(S&P Dow Jones Indices 2013b: 3; Nagaraja, Brown & Wachter 2010: 2.)

The S&P/Case-Shiller Indices are concentrated to one housing market stock or condominium type, single-family housing stock, and is designed to measure, as accurately as possible the changes in the total value of all existing market targets including to this category. Indices are based on observed changes in single-family home prices. The indices are designed to measure increases or decreases in the market value of residential real estate and composite indices are designed to measure market changes in 20 or 10 defined market areas and three different price tiers. (S&P Dow Jones Indices 2013b: 7-8.)

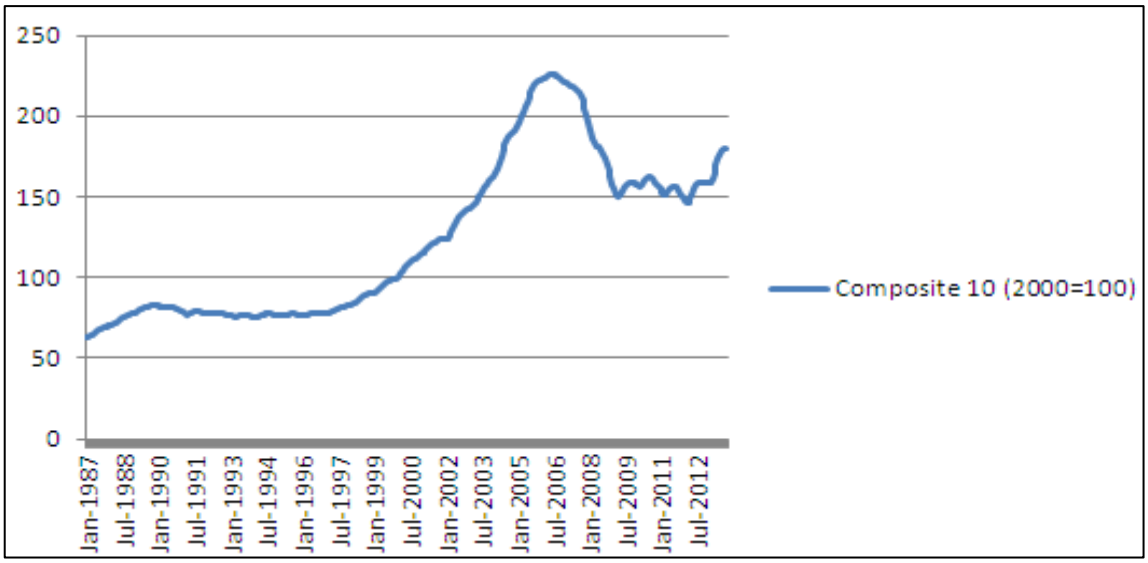


Figure 1: S&P Case-Shiller Composite 10 Index 1987-2013 (S&P Dow Jones Indices 2013a).

When examining the above S&P/Case-Shiller Composite 10 index we can see the previously mentioned Case and Shiller described period of steady increase. This increase in the index Case and Shiller has studied to be explained by increase in household incomes. The last years heavy rise and in mid-2007 inversely heavy downfall are due to financial institutions weakened estimates concerning the private customers risk and loan payment ability. Although there can be seen a gently sloping steeper rise in the long term in house prices in the U.S. it is notoriously difficult to actually recognize price bubble prior to a price crash. This definition of the housing bubble we are going to discuss in the next paragraph. (Ambrose, Eichholtz and Lindenthal 2013: 2.)

4.4 The definition of the housing bubble

The last few years have seemed to justify economist and policymakers beliefs of rapid housing market boom or in other words bubble turning into bust to be true. Ambrose, Eichholtz and Lindenthal (2013: 14) study from very long period from year's 1650 to 2005 covering 355 years of the housing market price data however showed that bubble crashes are not always inevitable in the short run. One of the Ambrose et al. (2013) study implications was that it is decidedly difficult to know when, or even if, an asset price bubble will collapse.

Ambrose et al. (2013: 14) study showed that markets in Amsterdam, Cape Town, and Paris characterized a strong price gains in the last decade but didn´t experience the free fall seen in many other markets as for example in Spain, U.S. or Ireland. The demand in these markets was simply so strong that foreign capital inflows in addition to the stable market capital from inside the market area were sufficient to keep the prices in normal level. So although housing market prices rose to all-time high, the markets have merely stabilized.

And to those who judge international financial institutions the Ambrose et al. (2013: 14) results also suggest that it is unwise to criticize lenders for originating mortgages at the peak of the market cycle and subsequently suffered significant losses due to borrower defaults, since historical trends show that it is possible for price bubbles to slowly deflate over long periods such that the losses may not have occurred on behalf of the lenders as it was in the case of Amsterdam, Cape Town and Paris.

Economic scientists have for many years tried to resolve the reasons for the latest collapse seen in home prices in the U.S. Shiller (2008: 33) shows in his study interestingly the U.S. home prices, building costs, development of population and interest rates in the same figure. From the figure demonstrated in the study it can be seen that however there was a great rise following sharp decline in home prices index between years 2000-2010 there were no fundamental changes seen in construction costs, population or long-term interest rates at the same time of the boom. (Shiller 2008: 5-7, 39-47)

The reason for crisis in a bubble was that policymakers in the U.S. wanted the

homeownership to rise to new levels and therefore homeownership reached 68.9 percent in 2005 meaning that homeownership increased 11.5 percent in period between years 1997-2005. It can sound good in the light of these numbers and that the private households wealth was growing well but if we go further to the one individual homeowners properties we can say that homeownership was largest in the West part of the U.S., for those under the age of 35, for those with below-median incomes and for Hispanics and blacks. In one sentence: too much money for customers having too low quality measures or payment ability. The crisis spread all over the world because these private customers' loans were bundled and sold forward to the institutional investors as "good quality investments" rated by the recognized credit rating organizations. (Shiller 2008: 5-7, 39-47)

The banks loosened lending policy and the features of one typical individual loan customer can explain part of the house price rises but what if someone would had said to the potential home buyer that: "You should not pay so much for this house, make an offer/bid that is at least 10 percent from the asking price"? The one explanation for so rapid price increase relates to this aforementioned question and Shiller (2008) has been studied this one potential reason for rapid price increase to be so called "social contagion" that relates to the idea of housing as a sure route to financial security and even wealth. In the survey conducted by Karl Case and Robert Shiller in 2005, when the market was booming, the San Francisco home buyers median expected price increase over next ten years was 9 percent in a year and the mean expected price increase in a year was 14 percent and about one third from the respondents reported occasionally over 50 percent increase per year so the expectations were truly extravagant. Of course in the above mentioned situation where someone would be the so called "voice of truth" some other potential home buyer who would be definite for house prices to increase at least 14 percent would make a winning bid. So the problem is in the economic and social environment. (Shiller 2008: 5-7, 39-47.)

The above mentioned is the reason to study housing prices bid-ask spread because that can possibly reveal house buyers potential optimistic or pessimistic expectations prevailing in the housing markets. Sooner or later in the housing markets some factor boosts the "infection" rate sufficiently above or under the removal rate for an optimistic or pessimistic view of the market and as a result the spreads to become wider.

After this section the reader should have formed a comprehensive picture of how prices are formed in the housing markets. Going naturally forward, in the next section we will

discuss about and open the operation of the Finnish housing markets that it would improve the understanding of the statistical part of the study in addition to this section.

5. HOUSING MARKETS IN FINLAND

The total area of Finland is about 337,000 square kilometers from which about 2 percent is developed meaning cities and villages and about 10 percent is for agricultural purposes. This means that from the total country area nearly 90 percent of the acreage is forests, swamps and water systems. Even though there can generally be seen some similarities when comparing housing markets between countries this above mentioned land use in Finland makes some differences when comparing Finland to other countries from the aspect of housing markets. (Quigley & Hårsman 1991: 66.)

When comparing housing most countries share similarities in objectives and therefore there are somewhat common elements between countries. On behalf of housing the Scandinavian countries have traditionally go hand in hand in terms of policy measures. We can say that in housing the dissimilarities between Scandinavian countries are rare but however there has been tendency in Finland to imitate not Scandinavian countries as a whole but more Swedish reforms and acts taken in developing the structure and functioning of the housing markets. (Quigley & Hårsman 1991: 63.)

5.1 Features of Finnish housing markets

Finland and other Scandinavian countries may be in line with each other in the housing market on behalf of the major policies but the way how the housing transactions are done on a smaller scale is somewhat different from the rest of a Nordic or Scandinavian way. It can be said that trade occasion is somewhat quite similar but traded housing type is divergent. The following paragraphs describe the trading process in Finnish housing market in practice. (Quigley & Hårsman 1991: 63; Kasso 2006: 9.)

As previously mentioned Finland has a relatively large surface area of country in terms of population, and for this reason in the popular areas, which are often found in developed localities and growth centers, condominiums and properties sell and change owners frequently and quite quickly. Of course, the marketing time depends on the apartment type and size as it is also in other marketplaces in the world. Sellers find buyers to their condominiums often thru newspaper ads or internet forums which are intended for sale notifications. In Finland, however, only one-fifth of the housing business is done between the seller and buyer without a real estate agent, so the professionals are used more often in residential transactions. Use of the professional operators in trades has increased since the 1990s steadily. (Kasso 2006: 9.)

The reason why there is commonly to use professional intermediary in housing transactions in Finland is, among other things, that the housing and real estate-related legislation is relatively complex, and market participants' awareness of housing sales in the compulsory practical measures has decreased. It is, therefore, in practice, a more complex to sell apartments self and thus easier to use help of a real estate agent. In 1990s in Finland came into force two main laws regulating housing sales, housing condominiums trade is regulated by the Housing Act (*Asuntokauppalaki*) and the residential real estate is governed by *Maakaari*. (Kasso 2006: 10.)

In Finland, the holding of a property asset can be divided into two main categories: direct ownership and indirect ownership of real estate. Most commonly properties are held in Finland, however, generally through a separate property company and such a company is called a housing condominium. Finnish housing condominium is one of a kind and this type of communities does not exist in the rest of the world. To the direct real estate ownership in Finland belongs the privately held real-estate property, as well as city or private -owned rental plots properties. Most commonly, a straight real estate is owned by a private home owner and in that situation the landlord owns the land and possible residential building or buildings which are located in the property without an intervening estate companies. (Kasso 2006: 27.)

The situation is slightly different in directly owned condominiums for which the condominium company usually owns the land on which the company is located. The most common indirect ownership form is Finnish Condominium Company. The Condominium Company usually owns the land and the building, but the ground can also be rented, for example, from the city in which the property is located. The cost of housing may be more expensive in the rental plot located Condominium Companies than companies located in its own grounds because the plot rental is usually included in the monthly maintenance charges payable by residents. However, the lease periods are relatively long, and the rental costs are not at risk to short -term fluctuations but on the contrary are stable. (Kasso 2006: 27-28, 38.)

As mentioned above the sale of an apartment without a broker is therefore relatively difficult in Finland and thus a use of a real estate agent is very common. The trust towards real estate agents in Finland is relatively high, although so far compulsory education or going through a particular education to become a real estate agent is not required. Real estate agents degree system, however, is directed and maintained by Finnish Chamber of Commerce. A person who has completed degree offered by the

Chamber of Commerce may use the title of *LKV* which letters in English stands for Licensed Real Estate Agent. (Kasso 2006: 11.)

Real estate agents companies in Finland are registered to the County that keeps and maintains the brokerage business register (*välitysliikerekisteri*). Brokerage entered in the register shall be entitled to use the title of a licensed real estate agent or an abbreviation of the LKV and the official responsible for these brokerage firms are required to have accomplished a real estate agent approved qualification or in other words Licensed Real Estate Agent (*LKV)* degree. The number of real estate agent companies having proxy to exercise brokerage business registered in Finland, moves to several thousand, and most of the real estate broker dealers are less than ten broker offices. Below table 1 lists the major largest licensed real estate agencies working in Finland. (Kasso 2006: 11.)

		Founded
1.	Kiinteistömaailma Oy	1990
2.	HUOM! Huoneistomarkkinointi	1969
3.	Habita LKV	1989
4.	Huoneistokeskus	1953
5.	OPKK	1990*

Table 1: The largest real estate agent companies in Finland

Many of large Finnish real estate brokerage businesses operate in either a franchise basis, or under the name of a major bank or financial institution. Finnish real estate broker dealers working and dealing under the name of a popular bank are usually seeking at least two benefits from the housing markets. First working under the name of a trusted bank brings reliability and credibility to the real estate brokerage business activity from customers' side of the markets. Secondly with the bank acting behind the real estate business the synergies can be fully utilized. It is clear that when banks customers are asking mortgage they need a house for which to consumption in. Thus real estate agency can find a buyer to their apartment on sale before the first presentation of a house because banks databases have customers who have already agreed to loans with the bank and are just in need to have a right kind of a home.

* The year when first OPKK branch in Helsinki was established.

Franchising principle often work in such a way that the so-called proxy agent works as a parent to share licenses regionally and one regional office is a franchise shop based to owner contractors or partners. In 1990 established *Kiinteistömaailma* is perhaps Finland's largest single real estate agency chain with a staff of about 800 agents and a few administrative personnel. *Kiinteistömaailma* has about 120 apartment stores around the country and the stores are independent franchises owned and operated by private limited companies. *Kiinteistömaailma* brand is owned by Danske Bank based in Finland which is part of the Danske Bank Group operating in Denmark. *HUOM! Huoneistomarkkinointi* was founded in 1969. The National Banking Group operated in Finland at the time decided to set up a business specialized to real estate agency. The National Banking Group bought shares of Väinölä Real Estate Agent Services and changed its name to Huoneistomarkkinointi plc. *Habita LKV* is a private real estate agency established in 1989 which operates nationwide through 48 offices. *Habita LKV* employ in about 250 real estate agents and sales consultants. *OPKK* Real Estate Service is a part of the OP-Pohjola group which is the biggest financial institution in terms of market share of household lending. (Kiinteistömaailma 2013a, Huoneistomarkkinointi 2013, Habita 2013.)

Huoneistokeskus is perhaps one of the first Finnish real estate businesses. *Huoneistokeskus* history is interesting and it was until 1969 100 per cent owned by its founder Veijo Merjamaa and his wife Eila Merjamaa when Union Bank of Finland Ltd acquired 20 per cent of the share capital. In addition, in 1970, the insurance company Fennia acquired a 30 percent stake in *Huoneistokeskus*. Merjamaa owned until 1977, half of the company's share capital. *Huoneistokeskus* can be said to been the pioneer in real estate industry as the Merjamaa brought many reforms from the U.S. that sought to apply the conditions in Finland. Among other things intensive in-house training, the first female sales representatives as well as Sunday presentations were part of these reforms that came into Finland to stay. (Huoneistokeskus 2013.)

Huoneistokeskus can be the eldest or earliest established real estate business company but today the *Kiinteistömaailma* like mentioned before is perhaps the largest in measured by market share in Finnish housing markets. There is interesting practice for *Kiinteistömaailma* to do real estate deals what other Finnish real estate brokerage companies' don´t do and it is called *Tarjouskauppa* (Trade offer in english). Trade offer means that the offer to buy a house or condominium is not made below the asking price of course buyer can make an offer more than the asking price in traditional procedure but in Trade offer the asking price the lowest limit to the purchase price. So the real

estate broker or seller don´t accept the bidding prices below the asking price. Such a different way of trading dwellings or condominiums can of course affect to the results of this study. However, it has to be noted that this kind of trading is not the prevailing procedure and the traditional way to follow through the real estate deal is still the prevalent option. (Kiinteistömaailma 2013b.)

5.2 Development of Finnish housing markets

As noted at the beginning of this chapter from Finland's total surface area a large part is the forests and thus in practice uninhabited areas. The use of the area and its potential for use of course affects to the housing market and these effects are good to look together in order to create an overview of the housing market in Finland. In Finland there is a large area with a few metropolitan areas and advanced centers of growth unlike in many Central European countries, where the situation is different and in these countries there can in a relatively small area accommodate several million peoples. This makes the housing market very different in Finland than in other parts of the world and especially in nearby Europe for example Germany and France which are both larger than Finland in terms of area but have high residential density and also yet smaller Switzerland and Austria few to mention. (Quigley & Hårsman 1991: 65-77.)

The population of Finland is currently about 5,400,000 (Statistics Finland 2013). The biggest change in size of the population took place between 1840 and 1970, in this period Finland had a population tripled from the start level. Since 1970 the population has remained more or less unchanged. To pick up one of the growth center in Finland's housing markets is the region of Helsinki. Helsinki is the capital of Finland and the Helsinki metropolitan area has developed and is developing very fast. In 1880 the population in Helsinki metropolitan area was 556,000 after a hundred years later the population was already 783,000 in 1980. During this period the population in Helsinki metropolitan area grew at a furious pace. In 1980 the Helsinki metropolitan area crew also beyond its borders. It was the case that this growing extra population simply did not fit in to designated areas and also the financial resources did not support the rapid growth, in other words, the construction sector was not able to produce enough houses to this population. This resulted in the fact that private landowners were able to sell their land to people and construction companies in need for land and thus began to develop the area outside Helsinki metropolitan area. The people headed up and sides from the Helsinki metropolitan area and an area called the Uusimaa began to develop.

Uusimaa region includes the Helsinki metropolitan area which in turn includes Helsinki, Espoo and Vantaa. (Quigley & Hårsman 1991: 65-77.)

Looking at the trend in housing prices in Finland it is best to look at and include figures concerning the Uusimaa region or the housing price levels in the Helsinki metropolitan area in this study. This area is currently relatively sparsely populated, although the undeveloped land is still abundant, but the migration has been positive and the housing demand and supply can be said to be comparable to the other investigated regions in other countries. Over the 1961-1985 period in the Helsinki metropolitan area, housing prices rose more than tenfold. The real increase in prices during this period has also been a significant accounting nearly 60 per cent. When looking at the possible reasons to so rapid increase in years from 1961 to 1985 the increase in construction costs was about the same as the rise in housing prices and, consequently, these readings developed at the same pace so it is obvious that if the cost of construction increases the growth is often reflected into house prices. (Quigley & Hårsman 1991: 65-77.)

When looking at the historical development in housing prices the housing prices seems to have become dislodged in Finland after 1987-1991. The development of housing prices and construction costs was heavily different in 1987-1991. The difference in construction costs and the price of a plots resulted to the sharp rise in housing prices. Housing investments was at its peak in Finland between the years 1987-1990. Alone, during these years, housing prices rose in real terms by over 60 percent in just over two years from 1987 to 1989. Finnish housing price development has been proven to have a bubble during these years. The bubble was attributed to the financial markets and caused by the release of a structural change in financial markets. Mortgage loans and construction loans improved availability and decline in the required self-financing were among the factors that contributed to the bubble. Real estate investments as a share from GDP is not yet in the 2000s in the early 1990s level although the housing prices started to rise again after the 1996. (Kivistö 2012: 23; Quigley & Hårsman 1991: 65-77.)

Looking at the development of the housing markets in Finland to provide a global market level comparison it is good to look at the ratio of house prices to rents. As mentioned earlier house prices are in Finland in recent years continued to rise but housing prices in the 2000s does not seem to differ on the balance level relative to rents. In general, when talking about the cost of living, it is said to be remained the same over the past decade. In owner-occupied housing, housing costs, however, are affected by the rate of interest, unlike in the rental markets. Owner-occupied housing costs in relation to

the cost of rents have declined due to falling interest rates. Lengthening of the maturity of housing loans even up to a maximum of 25 years has left room for growth in the size of the mortgage so that debt service costs relative to household incomes have grown disproportionately. Owner-occupied housing in relation to rental housing in Finland has become more affordable. (Kivistö 2012: 4-5, 23.)

Kivistö (2012: 6) shows in his study the development of housing markets in Finland well and discloses all the significant factors relating to the housing markets and the housing markets price formation into the same figure. In the study Kivistö (2012: 6) shows that the construction costs have remained steady but the price of plots or properties have increased sharply. This of course have resulted to the price rise in housing and although construction costs would remain minor, the price of housing cannot be stable if the price of properties where the houses are build rises more aggressively than construction costs at the same time.

Financial market interest rate factor in addition to the above mentioned rising demand for housing in Finland and especially in the Helsinki metropolitan area have affected the housing prices so that they do not, at least have fallen. Housing prices are also supported by strong income growth, population growth, migration centers, as well as the growing number of dwelling units. Although the prices have increased steadily there can also be seen declines for example in 2013 spring. A closer examination of the recent past and especially the spring of 2013 when came into force the new levels of asset transfer tax. Asset transfer taxes increase could be seen however in a fairly small oscillation when looking of housing demand. In this case, transfer tax was changed to include the so-called debt portion of housing price. That is, the tax will no longer be paid for the debt-free selling price but instead the selling price including the housing debt. (Kivistö 2012: 23.)

Now we have presented and discussed about the theoretical aspects relating to the subject of this study and reader should have deeper knowledge of the housing market price formation and Finnish housing markets development and characteristics. In the next section we discuss about the used data and attained methodology applied in this study.

6. DATA & METHODOLOGY

The results presented in this study are based on a case study of state in the Finnish housing market. Finland's housing market will be reviewed not only on behalf of the Helsinki Metropolitan area but as well as the cities of Turku, Tampere, Jyväskylä, Vaasa, Oulu and Joensuu although the best prediction in an international scale is provided when examining deeper the state of the Helsinki metropolitan area housing markets. In addition to city of Helsinki the Helsinki metropolitan area includes also the cities of Espoo and Vantaa. The areas used in the study were selected on the basis that they represent each geographical regions in Finland: South, East, North and West. These above-mentioned cities are the largest metropolises in their own territories and, therefore, we can get a good overall picture of the Finnish housing markets.

In this study, the results presented from respective market areas show how the housing market has contributed in the long term. In this study, the analysis focuses on the data attached between years 2005 and 2012 the first point is therefore first quarter (Q1) in 2005 and the last observation period is the last quarter (Q4) of 2012. The time interval considered is therefore in total seven years. What makes the studied time interval interesting to investigate is the fact that it includes the still ongoing global financial crisis. In this study it is not intended to devote further attention to the consequences of the financial crisis, but the results can certainly be inferred from the fact whether this on-going crisis have had an impact on the Finnish housing market.

The list and the selling prices used in this study are gathered from the open market. In this study, the data used for housing list prices, were gathered from one of the largest market places or real estate sales portal in Finland in where real estate brokerage companies are searching buyers for their items on sale. Real estate brokerage firms report their list prices directly to this portal and these offices include the above-mentioned previous sections major real-estate agencies, as well as regionally based smaller market participants that numbers more than one hundred.

In Finland, the statistics of the housing market selling prices are maintained on behalf of Statistics Finland. Statistics Finland uses quarterly statistics for publishing housing data so this study also sets out quarterly observations concerning list and selling prices.

In this research there has been made certain exclusions concerning the housing market

data. Studying all housing types separately would be laborious because inclusion of all housing types would be almost impossible due to the resources used in the study. To make a broader research there should even be set up a distinct group whose members would concentrate on their own parts of their regions. This study focuses in general on all housing types but the more advanced study is made on behalf of the old condominiums list and transaction prices. As can be seen also the new constructions are excluded from the study.

This research does not make distinctions in apartment types but the data dealt in the study consist of all apartment types such as studio apartments, one bedroom apartments, two bedroom apartments and greater than four room apartments. As mentioned earlier sharing the data to apartment's types would be rigid and the combined data thus gives generally a better picture of the state of the housing market in Finland as a whole. Studying or inclusion of the privately held single-family real estate's separately in this study would also be difficult due to their different trading practices. On behalf of the real estates at the time of this study in Finland has, for example, become possible to make real estate transactions electronically over the internet. Commercial premises transactions are also out of the scope of this study. This trade between the companies also differs somewhat from the private person's condominium and apartments transactions.

	Helsinki	Espoo	Vantaa	Tampere	Turku	Jyväskylä	Vaasa	Joensuu	Oulu	**Total**
2005	14 238	6 817	5 241	6 783	5 615	2 581	1 996	1 518	7 357	52 146
2006	18 594	8 843	7 095	10 398	8 218	4 200	2 551	2 214	10 186	72 299
2007	22 313	8 959	7 583	12 487	11 517	6 105	2 925	3 015	12 877	87 781
2008	26 566	11 583	8 436	13 561	14 065	7 609	3 673	4 257	15 471	105 221
2009	16 604	7 739	6 761	9 310	9 990	6 436	3 142	3 942	11 142	75 066
2010	15 305	6 625	5 474	8 965	9 489	4 982	3 107	2 810	10 539	67 296
2011	17 900	8 392	6 696	11 805	11 198	6 621	4 286	3 764	12 494	83 156
2012	20 859	11 904	8 397	13 161	11 701	8 305	4 977	4 254	14 405	97 963
Total	152 379	70 862	55 683	86 470	81 793	46 839	26 657	25 774	94 471	640 928
Condominium transactions	118 535	28 305	25 233	54 896	51 261	26 456	15 966	8 371	50 996	380 019
Condominium transactions %	77,8 %	39,9 %	45,3 %	63,5 %	62,7 %	56,5 %	59,9 %	32,5 %	54,0 %	59,3 %

Table 2: Number of transactions per year and the share of the condominiums transactions from the total transactions

Above table 2 describes the size of the used data. The number of all transactions is respectively 640.928. These transactions form the basis to the mean list and transaction prices calculation. This study differ from the other Finnish housing markets studies and the used data is over twice as much as for example Einiö et al. (2007) study. Though

Einiö et al. (2007: 4) study focused only to the Helsinki Metropolitan area in years 1987-2003 and this study covers also other regions than Helsinki and its vicinity. Einiö et al. (2007) study contained the previous financial crisis in Finland in the early 1990s which was shown clearly in the transactions figures. The same effect is also shown in the dataset of this study and the global financial crisis that started in mid-2007 is showing with a slight delay in transactions in Finland also. The years 2009 and 2010 have been shown to be the quietest years in Finnish housing markets since the start of 2000s after the dotcom bubble bursting.

The reason for taking the condominiums overall into closer look in this study is also showing from the table 2. The number of condominiums transactions is great in Finland and the housing markets are largely based on condominium transactions. Although there appears to be differences between the areas the total amount of condominium transactions from all housing types transactions accounts almost 60 percent. From Helsinki metropolitan outer cities Tampere and Turku are almost reaching the capital cities figures because these cities are populated and from the land use large part is used to construct high-rise or multi-store buildings and the number of condominium transactions from all housing transactions continues to grow in the future. From the data it is also notable that from Helsinki metropolitan area other cities Espoo and Vantaa the number of condominiums transactions is very much less than in Helsinki. However, these figures are expected to be on the rise although there is lots of land in Espoo and Vantaa that are zoned only for residential housing purposes. Still there are areas that are envisaged to be urban concentrations.

The sample sizes of list prices from the portal database are significant and give good proxy of the markets. The Statistics Finland produced transaction prices are observable bid prices in the housing markets in Finland and these prices are the final (contract) prices for which the trade itself has been done. It is also the minimum transaction price, or stop price. The highest unaccepted bid price is not publicly available information in Finland or this kind of information administrator cannot be found from Finland. The actual contract price, therefore, is proxy for the highest unaccepted bid price. In this study the spread between list and transaction prices are calculated as follows

(1) $$S = TP - LP$$

In the above formula S stands for the spread and LP for list price and TP the actual transaction price. The spread is therefore the difference between the sale price and the

transaction prices. To better describe the difference between list and transaction prices and to also better compare the different areas the difference is also showed in percentages from the list price.

(2) $$S_{(p)} = S \;\; TP$$

Because the list prices of condominiums and row houses are notified in the portal per month, it is necessary to convert these figures to quarterly (LP_q) and therefore it is better to compare the mean list price of the followed three months to the actual transaction prices notified quarterly. The means of the list prices per month are calculated as follows.

(3) $$LP_q = \frac{LP_{mx} + LP_{my} + LP_{mz}}{3}$$

In the above formula the *LPmx*, *LPmy* and *LPmz* stands for the list prices in the month from where the average list price is calculated.

After we have calculated the average list prices and compared those to the actual transaction prices it is somewhat easy to find out the conclusion to the first hypothesis.

Pursuing the possible percentile difference in the bid-ask spread across time is not enough but in order to get better picture of the significance of the difference we have to use the statistical t-test to test whether the difference in asking price and bidding price is statistically significant in time.

In the situation of two-sample t-test the average or mean of two samples is explored and the result should be explaining and shown whether the assumption to support the null hypothesis that the different population means are equal. A comparison of housing transaction and list prices, the difference between the null hypothesis and its counter hypothesis are (Statistics 2014.)

(4) $$H_0 : \mu_1 = \mu_2$$
$$H_1 : \mu_1 > \mu_2$$

In the above formula the μ_1 stands for the list price of the dwellings and μ_2 is the expression to the dwelling actual transaction price. Since in this study we are solely

interested in another group average (housing list prices) greatness compared to other (housing transaction prices) we can use the one-tailed test. As mentioned in the chapter three hypotheses and thereafter in chapter five due to features found in Finland housing markets the actual sales price is unlikely to be greater than the list price and it is therefore justified to perform a one-way test. Above, the hypothesis proposed by calculating the populations (bid and ask prices) variances are assumed to be equal, so the estimator to the population's common variance is calculated by using following formula (Statistics 2014.)

(5) $$s^2 = \frac{(n1-1)s1^2 + (n2-1)s2^2}{n1+n2-2}$$

The test quantities will then be

(6) $$t = \frac{\bar{x}_1 - \bar{x}_2}{s\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}} \sim t(n_1 + n_2 - 2)$$

The second hypothesis in chapter three was about the bid-ask spread predictability from the dwelling time on the market. This hypothesis is tested on behalf of the all market areas and in all dwelling types by simple regression analysis. The combined data should reveal the possible regression overall in Finnish housing markets between the bid-ask spread and the time on the market. When taking into closer consideration each area separately we can see whether there perhaps are exceptions in the separate areas to the national level of the outcome. Abdelmonem et al. (2004: 88-90) describes the simple regression analysis or method of least squares in formula as

(7) $$y_j = b_0 + b_1 x_j + u_j$$

The method is also called to method of least squares because the parameters b_0 and b_1 are estimated by the method of least squares. If the hypothesis two holds true and the bid-ask spread is wider in the areas where dwelling time on the market is longer, then the scatterplot constructed from the results should be linear and reveal the possible regression between the variables. (Abdelmonem et al. 2004: 89.)

The regression equation can also be rewrite in matrix formation what can explain this technique better. The matrix formulation of the regression analysis or method of least

squares can be expressed as follows

(8) $$y = \begin{pmatrix} y_1 \\ \vdots \\ y_x \end{pmatrix} \mathrm{x} = \begin{pmatrix} x_1 \\ \vdots \\ x_x \end{pmatrix} b = \begin{pmatrix} b_0 \\ b_1 \end{pmatrix} u = \begin{pmatrix} u_1 \\ \vdots \\ u_x \end{pmatrix}$$

In the regression model the regressand is the housing bid-ask spread and the regressor is the dwelling time on the market.

After testing the actual bid-ask spread in the Finnish housing markets and its statistical significance and the relation between the bid-ask spread and the dwelling time on the market in national and local level we can concentrate specifically to the Helsinki metropolitan housing markets.

To include or to take the finance aspect to this study it is especially good to view interest rate effect into bid-ask spread studies. The Helsinki metropolitan housing markets are studied by using multiple regression analysis to find what factors affect to the housing bid-ask spread most.

As the cost of search it is used the most common reference rate in Finnish mortgages 12 months euribor. The 12 months euribor is converted into quarterly observations. As it is clear the euribor rates are noted daily but in this study it is calculated the three months mean from these daily notifications.

The general expression and therefore the formula for multiple regressions are calculated as follows (Abdelmonem et al. 2004: 137-138.)

(9) $$y_j = b_0 1 + b_1 x_1,j + b_2 x_2,j + \cdots + b_k x_k,j + u_j$$

The matrix formulation in the general case remains exactly the same as in the simple regression analysis in the except that we need to add additional elements to X and b in order to incorporate additional regressors. So the matrix formulation is as follows:

(10) $$x = \begin{pmatrix} x_{1,1} & \cdots & x_{k,1} \\ \vdots & \cdots & \vdots \\ x_{1,n} & \cdots & x_{k,n} \end{pmatrix}, \; b = \begin{pmatrix} b_0 \\ \vdots \\ b_k \end{pmatrix},$$

and as before: $y' = (y_1, y_2, \ldots, y_n)$, $u' = (u_1, u_2, \ldots, u_n)$

Jud et al. (1995: 5) studied the effect of mortgage rates to housing bid-ask spreads and found that higher mortgage rates (associated with a decline in market activity and higher search costs) are shown to raise the spread between the listing and contract prices. And this finding was consistent with the notion earlier in the same study that higher search costs would lead to larger spreads as indicated.

6.1 Statistical significance

As in other studies also in this study researching the possible differences between many variables it is essential to determine the above mentioned research method and after that the appropriate level of significance.

The significance level can be determined also as a choice to the probability that the researcher rejects the null hypothesis, even if it is actually true. It can therefore be called also as a risk of an incorrect choice because this significance is also sometimes called as a risk level. Statistical reasoning can never say with certainty that a hypothesis is true or false, but it is always the likelihood that the researcher is prepared to reject the hypothesis.

There are certain methods to solve this risk level in hypothesis testing. The method to calculate the risk level depends on the form of the alternative hypothesis. Because we described in the previous section that the alternative hypothesis when testing the difference between list and the transaction prices is (Statistics 2014.)

(11) $$H_1 : \mu_1 > \mu_2$$

Then the critical value or the risk level can be derived as follows:

(12) $$\Pr\ Z \geq + z_a$$

In the above the *Z* is *N(0,1)* and therefore the rejection region is formulated as follows:

(13) $$(+z_a, +^{\infty})$$

In general, scientific researches or studies use 0.05 (i.e. 5 percent) or 0.01 (i.e. 1

percent) risk levels which are calculated as above described. If for example 5 percent risk level is used as a criterion of significance this means that of the population 95 percent of the observations are confidence qualified, but at the same time, the probability of error is 5 percent. (Yates, Moore & Starnes 2003: 569.)

Yates et al. (2003: 569) state that many statistical test final results are presented in the form of so-called p-value which indicates the probability of a false conclusion as described above. If the calculated p-value is less than 0.05 it is used to talk about the results statistically "almost significant" if it is less than 0.01 the result is statistically "significant" and if it is less than 0.001 the test results are statistically "highly significant". There are certain marks or asterisks to describe the statistical significance which is also used in this study to point out the test result statistical significance. The asterisks are as follows:

(under 0.001 = ***) Highly significant
(under 0.01 = **) Significant
(under 0.05 = *) Almost significant

In empirical and statistical studies in all fields of science no matter it was economical or biological study, it is in general and most often used the 5 percent and 1 percent levels of risk. In practice the figures could also be for example 8 percent and 4 percent but in statistics theory there can be found only 5 percent and 1 percent confidence levels and no specific argument but the reason to use these confidence levels is that they are just over the years built up practices in statistics.

7. EMPIRICAL RESULTS

Empirical results of this study are reviewed in this chapter in the same order by which the three hypotheses were presented in chapter three.

First we look and discuss about differences in list and sale prices of houses. In terms of clarity the differences in list prices (ask) and transaction prices (bid) are presented first in euros and as a percentage and then we go through the statistical significance of these differences in sale and transaction prices of houses. Results are presented in consideration of the type of housing in such a way that first we examine the differences derived from all houses, and then we focus further on the sales and transaction price differences of flats or condominiums. On behalf of the bid prices it has to be noted that the observable transaction price in the housing market of Finland is the final (contract) price, and it is also used as the bid price in this study. The seller always has the right to choose the buyer for the apartment in sale and to offer the house, for example, to the second highest bidder, even if there had been a higher offer. The highest unaccepted bid price is not publicly available information in Finland and the use of the transaction price as bid price, therefore, is proxy for the highest unaccepted bid price.

After examining the sales and transaction prices differences we show and discuss about the result of regression analysis regarding between the difference (spread) in sale and transaction price of the apartment and the selling time on the market. In the hypothesis two it was argued on the basis of earlier studies, that the spread between sales and the transaction price would be higher in areas where housing time on the market is longer. In practice, the situation would be such that the seller must so to speak, to adapt the received lower price offer in areas where migration from the outside is negative. The situation is exacerbated by the fact that perhaps the seller or the sellers have a new target for a wanted new location and the seller do not want to delay the sale time in the hope of a better purchase price.

The third hypothesis and study focuses more particularly to the Helsinki metropolitan housing market and the regression analysis used to study the phenomenon that is described above in the previous chapter. In short the regression analysis also includes the normal mortgage reference rate used 12-month Euribor interest rate, and thus we are able to detect the potential impact of this reference rates increase or decline to sales and transaction prices difference or spread.

All housing types

The spread between the list and transaction prices of houses in euros is seen in the appendix 1. The appendix 1 is organized in such a way that all of the studied nine regions are represented as separate items and in the first line there can be seen spreads in list and transaction prices in the capital region areas: Helsinki, Espoo and Vantaa. The second line cities are located in Central Finland and those are: Tampere, Turku and Jyväskylä. The third row represents the northernmost part of the Finland and the line includes cities of Vaasa, Joensuu and Oulu.

When looking at the figures of the Helsinki metropolitan area cities Helsinki, Espoo and Vantaa which are presented in the first row of appendix 1 we can see in some respect the similarities in graphs. In all regions there can be seen a gentle increase in list and transaction prices at the beginning of the observation period from 2005 Q1 to 2007 Q4. This increase is followed by a steep decline between 2008 Q1 and 2009 Q1. The growth in transaction prices started from 2009 Q2 has remained relatively stable. Transaction prices in all regions have seen the small dip in the price level of 2011 first quarters. For individual regions there can be seen that in Helsinki the spread in euros has narrowed from the beginning of 2011 to this date, but at the same time the housing price per square meter has risen. In regards of Espoo the noteworthy point is the fact that even in the sharp decline period seen on behalf of the transaction prices in 2007 Q3 - 2009 Q1 the list (ask) prices are not, however, fallen but on the contrary asking prices have remained stable throughout the observation period. In that period the list prices in Espoo are not therefore seem to get into the transaction prices. This shows that the sellers have probably been aware through intermediaries (real estate brokers) that sellers in that period may not necessarily get the price at which is sought but the list price was set to higher level in hope to get higher offer prices.

The next line in appendix 1 of euro-denominated spreads review is regard of the cities of Tampere, Turku and Jyväskylä. These cities spread in bid and ask prices differ from each other significantly. Transaction prices per square meter are roughly the same range in Turku and Jyväskylä but Tampere seems to be the more expensive of the three measured by price per square meter. Tampere spreads on euro-denominated graph shows verging with Helsinki on at the same time period spread curve, with the difference that the price per square meter in Helsinki are very much higher. Of the three cities Turku and Jyväskylä stand out clearly even in relation to all other regions. In Turku there seems to be very large spread throughout the observation period. In euros,

the spread is almost at the same level with Helsinki in whole observation period but the average transactions as well as list prices are much lower in Turku, which makes the spread of Turku, therefore, in relation to a very much larger. In Turku it can be seen that the sharp fall seen in other regions in transaction prices caused by the financial crisis, is less steep or even completely undetectable. It is likely to be that the high list prices have been the reason for actual transaction prices remaining at the stable level throughout the observation period in Turku. In the case of Jyväskylä the spread has been very wide in 2005-2007 i.e. just before the financial crisis, then from 2007 Q1 onwards trade prices and list prices trend has been reversed, transaction prices have increased and at the same time, list prices have dropped slightly in 2009 Q4. After the beginning of 2011 spread in Jyväskylä bid-ask prices have started to widen again.

The last row in appendix 1 shows the differences between euro-denominated list and transaction prices in cities of Vaasa, Oulu and Joensuu. From these three areas in Joensuu and Vaasa there can be seen the same trend in the list prices development than in Turku so namely list prices have not fallen as a result of the financial crisis as much as the transaction prices. Rather it would seem that in Vaasa as well as in Joensuu list prices have reacted to the change in transaction prices in a slight delay i.e. the situation, therefore, was that the brokers or home sellers had discovered between 2008 Q1 and 2009 Q2 that the homes did not sold so easily and this resulted in transaction prices decline in the 2009 mid-term time. At this point it was seen that when list prices were going down, however, in this term there was already seen signs of recovery in transaction prices. At this time period the sellers have probably faced the positive surprise if the realtor had sold apartments and had feel for the ongoing market movement and discussions revealed the level at which the seller were possibly going to sell the apartment. Overall in the observed time period of 2005-2012 in Joensuu there seems to have been the smallest spread in euros. In Joensuu in 2010 the realtors or home sellers have known even exceptionally well the apartments transaction price as in this period the spread is very thin. In the period between 2009 Q3 2012 Q4 in Oulu the list price movement has occurred to be substantial when taking in view of all areas including the study. During this time interval, the list prices have fallen sharply and again towards the end of the 2012 rising. In this development, the most noteworthy is the fact that the transaction prices have not been following but instead have somewhat increased and thus evolved separately from the list prices.

After bid-ask spreads euro-denominated review it is a good to move on a little bit more detailed examination of the bid-ask spreads and to study and look possible spread in

percentage and then further study at the spreads observed statistical significance.

Percentage bid-ask spreads between list and transaction prices of all housing types can be seen in appendix 2 and below table 3. Of these the appendix 2 is more advanced and describes in a more detailed level the percentage difference of bid-ask prices. Where table 3 shows average yearly percentage differences the appendix 2 shows the quarterly differences. Appendix 2 has been gathered in such a way that in first graph box it is showed the percentage differences in Helsinki, Espoo and Vantaa. Second graph describes the differences in Tampere, Turku and Oulu and the final graph is formed from differences in Vaasa, Joensuu and Jyväskylä. The presentation is somewhat different than in euro-denominated perspective because these areas are about the same size measured in population.

When looking at the Helsinki metropolitan area percentage differences we can see firstly that the capital city Helsinki separates from the two other metropolitan area cities by magnitude between the differences. When trying to find possible answer to this fact we can turn on to table 2 describing the trading volumes between the studied areas. The Helsinki area is also distinguished on behalf of this point and it is clear that when there is lots of supply and limited amount of buyers the seller must usually meet the price offered by the buyer. The market conditions in Helsinki have seemed to be more hectic and fast-paced than in other metropolitan area cities. For example in Helsinki the spread has been in its highest level in 2008 Q4 – 2009 Q1 and in this time frame the trading volume has also been in its highest levels. It can be seen from table 3 that there has not been such time interval in which the percentage bid-ask spread would had been higher in Espoo or Vantaa than it was in Helsinki. When taking closer look to quarterly statistics we can see that Vantaa has passed Helsinki in percentage bid-ask spread just in the latest quarters of the observation period in 2012 Q3 and Q4.

	2005	2006	2007	2008	2009	2010	2011	2012	Mean
Helsinki	-11,5	-14,8	-13,4	-13,2	-18,2	-14,2	-11,9	-7,3	-13,0
Espoo	-5,9	-10,3	-7,6	-8,4	-10,6	-5,5	-6,1	-6,2	-7,6
Vantaa	-6,2	-8,9	-9,2	-10,3	-11,5	-7,0	-8,7	-7,0	-8,6
Tampere	-7,3	-9,5	-9,3	-10,9	-11,7	-9,9	-9,7	-10,0	-9,8
Turku	-12,5	-20,1	-19,8	-17,8	-16,8	-13,1	-13,4	-15,0	-16,1
Jyväskylä	-11,7	-13,7	-14,2	-11,1	-6,7	-4,6	-2,6	-7,1	-9,0
Vaasa	-2,6	-11,3	-13,6	-11,7	-12,6	-8,7	-7,1	-5,6	-9,1
Joensuu	-5,6	-5,6	-10,1	-10,3	-8,7	-3,3	-5,8	-7,2	-7,1
Oulu	-11,4	-9,1	-12,7	-14,3	-18,3	-14,7	-10,0	-9,8	-12,5
Mean	-8,28	-11,48	-12,22	-12,01	-12,79	-8,99	-8,36	-8,36	-10,31

Table 3: Bid-ask spread (percent), all housing types

In appendix two second graph there can be seen quarterly percentage bid-ask spreads development in Tampere, Turku and Oulu. In this quarterly graph it can be seen that Turku and Oulu clearly sequestered in the percentage bid-ask spreads from Tampere. The same thing can be observed from the yearly data also. Again it is good to look at the percentage bid-ask spreads yearly and quarterly data in the context of housing volumes of trade in the case of these cities. By looking these tables 2 and 3 together it can be seen that in Oulu the trading volumes of housing in relation to Tampere and Turku is very large taking into account that Oulu is a quite smaller city measured by the city population. Oulu's been for many years the municipality for which the migration has been strong and also the volumes in the housing market have been large. We can say that structural changes even in national level have been affecting to migration in Oulu. In Finland Oulu has been compared to be Finnish version of United States Silicon Valley because of number of large firms moving technical and telecom sector jobs to Oulu. Due to this structural change large numbers of highly educated people have been forced to search apartment or real estate from Oulu and therefore this group of people also have a good knowledge of the pricing of housing. This has affected so that the volumes in Oulu are great, homes are selling, but buyers have taken an apartment's sale prices too high and that the asking prices in Oulu have not been at the right price level leading to widening bid-ask spreads.

When looking at the final row of the appendix 2 of quarterly bid-ask spreads on percentage level in Jyväskylä, Vaasa and Joensuu we can see that the development of Joensuu bid-ask spreads is conversely to those compared from Vaasa and Joensuu. Vaasa, Joensuu and Jyväskylä are all the smallest market areas measured in trading volumes on behalf of all housing types but the situation is not the same on behalf of the bid-ask spread. By looking the statistics there cannot be found any reasonable explanation for the Jyväskylä highest bid-ask spread percentage in 2005. The volume of trading has been smallest in Jyväskylä in 2005 compared to other years trading volumes in the same city. After the upstream data in the beginning of the observation period in 2005 Q1 – 2006 Q4 there can be seen stable development in Jyväskylä bid-ask spreads percentage in 2007 Q2 - 2012 Q4.

Overall on behalf of the differences in list and transaction prices of all housing types in housing markets in Finland we can say in general level that list prices are 10.3 percent higher on average than actual transaction prices.

Until this point we have now seen that there are differences in list and transaction prices in housing in Finland on behalf of all housing types. Thus we can already accept the first hypothesis found in the chapter three and state that the actual sale price is below the asking price in every area under research.

However we do not want to leave this subject just stating the above but we are also interested of the statistical significance of these observed bid-ask spreads prevailing in different areas under research. Below table 4 describes the t-test statistics across time on behalf of the all housing types. Table 4 is similar to table 3 and describes yearly bid-ask spreads statistical significance. Table 4 tells the same thing what was observed before in the table 3 in a slightly different manner.

	2005	2006	2007	2008	2009	2010	2011	2012	2005-2012
Helsinki	-3,71 **	-6,63 ***	-19,02 ***	-9,81 ***	-5,26 ***	-14,35 ***	-24,02 ***	-11,00 ***	-4,82 ***
Espoo	-3,94 **	-7,21 ***	-6,95 ***	-5,90 **	-3,88 **	-5,48 **	-6,70 ***	-8,33 **	-2,86 **
Vantaa	-2,49 *	-4,39 **	-8,55 ***	-7,49 **	-6,09 ***	-8,04 ***	-12,58 ***	-6,44 **	-3,39 **
Tampere	-2,10 *	-5,69 **	-7,68 ***	-8,44 ***	-7,83 ***	-11,29 ***	-11,50 ***	-10,34 ***	-4,52 ***
Turku	-3,63 *	-12,05 ***	-44,27 ***	-17,62 ***	-12,34 ***	-12,03 ***	-15,93 ***	-7,80 **	-8,47 ***
Jyväskylä	-10,64 ***	-5,78 **	-20,37 ***	-10,27 ***	-4,52 **	-6,16 ***	-3,96 **	-3,86 **	-4,63 ***
Vaasa	-0,23	-5,00 **	-12,80 ***	-16,91 ***	-7,02 **	-4,77 **	-4,30 **	-4,10 **	-2,98 **
Joensuu	-3,32 *	-3,54 **	-8,63 ***	-5,57 **	-5,53 ***	-2,06 *	-4,14 **	-3,13 *	-2,82 **
Oulu	-7,37 ***	-9,35 ***	-24,74 ***	-8,11 **	-21,23 ***	-11,36 ***	-11,39 ***	-6,43 **	-10,41 ***

Table 4: T-test statistics for bid-ask spread, all housing types

Closer examination of the table 4 reveals that there is on regional level only one area and only one year found to be no statistically significant bid-ask spread at all. The year is 2005 and the area is Vaasa. When closer examining the reason for this deviation in statistics there can be seen a few factors that may have been affected to this insignificancy. In 2005 there were seen low trading volumes especially in Vaasa and the interest rates were relatively small in addition to these factors banks were also competing for the customers so that the margins were also relatively low. So people had the opportunities to buy apartments but the supply was not in the same level as demand was and thus there were seller´s market. Statistical differences are shown to be highly significant in the areas were the trading volumes were exceptionally highest in the whole observation period. Helsinki, Tampere, Turku and Oulu were all the regions where trading volumes were highest in the years 2005-2012. Jyväskylä region is also one of the highly significant bid-ask spread cities. Only reason for the statistical significance bid-ask spread in Jyväskylä in years 2005-2007 is that there could have been serious pricing errors in housing markets during this period. When closer examining the separate years in 2005-2012 from the perspective of the statistical

significance we can say that the 2007 was the year when bid-ask spread in all areas were statistically highly significant. It is noted that this was just before or at the trading volume peak.

Next we are going to analyze the observed bid-ask spread attained from one housing type, condominiums. On behalf of the condominiums it is not take differences in bid-ask spread between apartment types have not been studied.

Condominiums / Apartment houses

Because we already know that there is statistically significant differences in bid-ask spreads in among all housing types and that condominium transactions account for 59.3 percent of all observations it is therefore almost clear that statistically significant differences can be found among condominium transaction bid-ask spreads and therefore it is also more pleasant to examine the possible differences observed in bid-ask spread in condominiums compared to data obtained for all types of housing. Condominiums percentage bid-ask spreads are seen in appendix 4 and euro-denominated bid-ask spreads are presented in appendix 3. These figures are the similar in appearance but the content is from different data.

When examining the percentage bid-ask spreads on behalf of the condominiums in all areas under research there can be found two rallying points from the tables 3 and 5. First the boom bust cycle seems to be equivalent in both situations. In condominiums as well as in all housing types the boom has centralized to years 2007-2009. In these years the percentage bid-ask spread was in its highest peak and from table 2 we can see that the trading volumes were also considerably high levels in these years. The year 2012 has also been very dynamic measured by market activity in trading volumes but the bid-ask spreads have remained moderate and below the 2007-2009 level. Spreads have decreased moving into 2012 from 2011 but this development is delayed in relation to transaction prices because in this period price per m2 has increased and again list prices have followed increasing transaction prices and therefore increasing also the spread. Looking at the mean average across time from all areas under research we can say that percentage bid-ask spreads have been in relation to all housing types in higher level the total accounting – 12.5 percent when the corresponding figure on behalf of the all housing types was – 10.3 percent. We can thus assume that there would be smaller percentage bid-ask spreads if we would examine other housing types such as for example row houses, semi-detached houses or properties.

	2005	2006	2007	2008	2009	2010	2011	2012	Mean
Helsinki	-11,5	-15,1	-13,5	-13,3	-20,4	-15,2	-12,3	-8,8	-13,8
Espoo	-7,8	-9,0	-10,2	-10,6	-9,7	-4,8	-7,5	-6,5	-8,3
Vantaa	-8,8	-10,7	-9,3	-12,3	-15,7	-7,5	-8,5	-7,8	-10,1
Tampere	-9,3	-11,3	-11,4	-13,7	-13,8	-11,6	-11,0	-12,4	-11,8
Turku	-15,2	-23,8	-21,7	-20,7	-18,2	-15,6	-17,4	-18,8	-18,9
Jyväskylä	-12,6	-16,9	-16,5	-13,6	-7,2	-4,6	-1,3	-10,6	-10,4
Vaasa	-3,2	-13,6	-13,9	-15,4	-16,9	-11,4	-11,5	-9,9	-12,0
Joensuu	-3,9	-5,0	-10,5	-14,2	-18,6	-8,3	-11,8	-17,1	-11,2
Oulu	-13,7	-11,5	-15,4	-18,6	-25,8	-19,3	-13,3	-12,2	-16,2
Mean	-9,5	-13,0	-13,6	-14,7	-16,2	-10,9	-10,5	-11,6	-12,5

Table 5: Bid-ask spread (percent), condominiums

Second connecting factor to all housing types is that the regional order on behalf of percentage bid-ask spread in condominiums is almost identical compared to percentage bid-ask spread on all housing types. Largest percentage bid-ask spreads can be seen to be in Turku, Tampere, Oulu and Helsinki. These cities clearly distinguish from the areas under research. Earlier mentioned trading volumes have been in highest level in these areas and this is probably the factor that has also affected to percentage bid-ask spread to be so widen in the cities of Helsinki, Turku, Tampere and Oulu. Lowest trading volumes in the whole observation period have been in Joensuu, Jyväskylä and Vaasa. These are the cities where condominiums percentage bid-ask spreads have also been more or less the smallest. To the lowest part of the percentage bid-ask spread belongs also Helsinki metropolitan other cities Espoo and Vantaa. The reason for these areas in this class is obviously that the Helsinki is driving ahead in actual transaction price per square meter and the people who think Helsinki prices per square meter to be too high move to nearby towns seeking the lower purchase prices and are actually seeing the pricing very much lower than in Helsinki. Therefore bidding prices are much higher and therefore closer in compared to asking prices. We can see for example from appendix 3 that the list price per square meter in condominiums is not even close in Espoo and Vantaa when comparing it to Helsinki actual transaction prices in the observed time period.

When looking at table 6 that describes the t-test statistics of bid-ask spread on behalf of condominium regionally and the p-value attached we can see a few distinguishing factors when comparing it to the results of the same implementation for all housing types. The most noteworthy point is that there are much more none statistically significant quarters in t-test statistics on behalf of the condominiums. It seems that when moving closer and examining closer on different housing types we can see more clearly

in where the possible differences affect.

	2005	2006	2007	2008	2009	2010	2011	2012	2005-2012
Helsinki	-3,47 **	-6,21 ***	-19,47 ***	-9,36 ***	-6,36 ***	-12,98 ***	-23,62 ***	-8,02 ***	-4,77 ***
Espoo	-5,50 **	-11,84 ***	-8,23 ***	-5,13 **	-3,55 *	-1,97	-3,59 *	-4,77 **	-2,80 **
Vantaa	-4,41 **	-4,48 **	-10,48 ***	-7,13 ***	-8,71 ***	-8,24 ***	-9,75 ***	-7,40 **	-3,87 ***
Tampere	-2,38 *	-7,36 ***	-7,64 ***	-10,80 ***	-10,38 ***	-10,21 ***	-8,57 ***	-7,89 **	-5,16 ***
Turku	-3,65 *	-10,85 ***	-34,50 ***	-16,51 ***	-10,83 ***	-17,28 ***	-16,95 ***	-6,43 **	-9,82 ***
Jyväskylä	-8,45 ***	-5,42 **	-16,02 ***	-9,38 ***	-4,23 **	-3,80 **	-1,45	-3,62 *	-5,10 ***
Vaasa	-0,37	-5,34 **	-10,46 ***	-10,67 ***	-8,39 ***	-5,99 ***	-5,13 ***	-5,35 ***	-3,70 ***
Joensuu	-1,28	-2,84 *	-6,10 ***	-6,51 ***	-11,93 ***	-3,95 **	-10,52 ***	-3,23 *	-3,70 **
Oulu	-6,14 ***	-8,70 ***	-39,19 ***	-8,54 ***	-65,43 ***	-11,52 ***	-10,98 ***	-5,53 **	-10,10 ***

Table 6: T-test statistics for bid-ask spread, condominiums

We can say that there is seen no statistically significant bid-ask spreads in 2005 on behalf of Tampere, Turku, Vaasa and Joensuu. Although the bid-ask spread in Turku develops considerably wider in 2005 when going towards the Q4 the average in bid-ask spread seems to be still in moderate level and thus resulting that the bid-ask spread is not statistically significant but almost significant. In addition bid-ask spreads in Helsinki, Espoo, Vantaa, Jyväskylä and Oulu in 2005 are seem to be statistically significant. Also there seems to be no statistically significant bid-ask spread in Espoo in 2010 when percentage bid-ask spread have been - 4.8 percent. Jyväskylä also distinguishes from the all housing types examination in 2011 when there is seen no statistically significant bid-ask spread in condominiums housing market.

By conclusion we can state that there are two aspects in difference in bid-ask spreads between different housing types. On behalf of the condominiums the overall result from whole observation period is that the bid-ask spreads are more statistically significant in 2005-2012 but bid-ask spreads thus move more in accordance with the trend. So if the research would have been executed in for example 2010-2013 the result possibly be different and that the condominiums bid-ask spread would not be statistically so significant. Because there is more none statistically significant bid-ask spreads among condominiums in bust and relatively larger bid-ask spreads in boom market we can say that trading volume affects more to condominiums bid-ask spread thus in short when there is lots of supply and demand is on normal level the buyers are more likely to bargain more from the list prices conversely when the market is quieter there is no bargaining power on behalf of buyer and therefore there is no need to seller to sell the house on much lower price what they are asking from the condominium.

When trying to find answer overall so highly statistically significant bid-ask spreads in

Finnish housing markets one possible answer may be found from aversion of so called loss realization. Einiö et al. (2007: 5) study showed that average holding period of apartment in Finland is about 5.6 years. In the observation period the actual transaction prices have raised significantly and when examining the rapid downfall in 2008-2009 we can see that if a person would had bought an apartment in 2006 Q1 and sold it again in 2009 Q1 there would had not been seen any loss but instead the value of transaction would on average be above the 2006 level. The thing which is trying to be clarified in here is that home sellers are satisfied to the bidding prices that they get so long as they go above the apartment buying price and in this period between 2005-2012 the rise of transaction prices have been so rapid that the bidding prices have exceeded the expectations of sellers and therefore the best bidding price has been approved.

Time on the market affect to bid-ask spread

After examination of the bid-ask spreads regionally and the statistical significance of those observed spreads in study period 2005-2012 we can move on to examine the possible effect of time on the market to the bid-ask spread. The hypothesis in chapter three stated that "the spread between list price and contract price of dwellings would be larger in the areas where dwelling time on the market is longer".

To discover answer to this hypothesis we constructed simple regression analysis which was consisted of observed spread in euros and time on the market to those observations thus we can examine appendices 5 and 6 respectively. The analysis was made in both cases on behalf of all housing types as well as for condominiums alone. In appendix 5 there can be seen summary statistics for simple regression analysis for bid-ask spread and the time on the market and figure 3 shows the scatter plot of these observations.

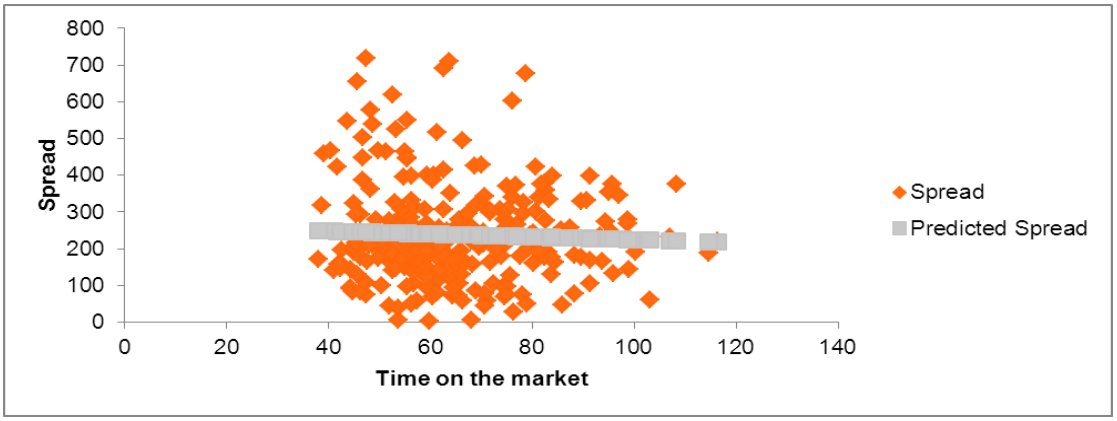


Figure 2: Scatter plot for bid-ask spread and time on the market in all housing types

Immediately we can see from figure 2 that the plot resembles random observations and therefore there exists little or no reason for suspecting lack of independence. Instead data in the plot seem to be a sequence of random standard normal numbers. This evidence gets more bases when examining appendix 5 where we can see that the R-Square for time on the market over bid-ask spread is only 0.2 percent. Also the Anova F-test shows no statistically significant p-value (p 0.43 > 0.05).

The situation is little bit different when examining results on behalf of condominiums. The figure 3 describes the scatter plot obtained from regression between condominiums bid-ask spread and time on the market. From the figure we can see that there can be seen more positive trend in regression than in the case of all housing types. Also the summary statistics in appendix 6 show that the R-square for time on the market over bid-ask spread is 3.1 percent and correlation is 17.7 percent. Also the Anova model statistics p-value can be considered to be statistically significant (p 0.002 < 0.05).

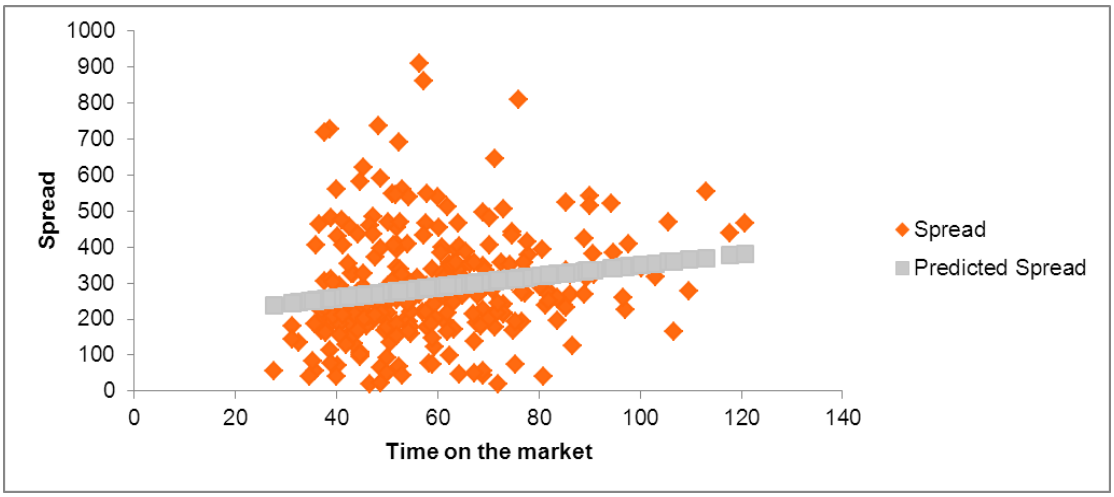


Figure 3: Scatter plot for bid-ask spread and time on the market in condominiums

The result and therefore decision of whether to reject or accept the hypothesis on behalf of the time on the market affect to bid-ask spread is somewhat multidimensional. At this point we have to accept the hypothesis and state that the bid-ask spread is larger in the areas where time on the market is longer. This conclusion is based on the fact that the parameter estimate in all housing types was very close to zero and on behalf of the condominiums parameter estimate was somewhat more positive. The reason for all housing types zero parameter estimate result can be explained by the different housing types. For example if we take a high surface area reasonable price property in Mäntyharju that is a beautiful lakeside town in southeast Finland it can take many

months when a potential buyer would even be interested in target property but if the person who likes characteristics of the property in sale and wants the object he or she is likely to pay whatever in order to get the desired property.

Still in brief the obtained results however proves on behalf of condominiums as well as all housing types the fact that when a suitable apartment comes ahead the buyers are willing to pay as much is necessary to get the apartment no matter how long apartment has been on sale and in addition that if seller is so to speak forced to sell the apartment for some specific reason he or she is ready to sell the apartment quickly to the first bidder no matter how far the bidding price is from the list price as if there were an exception that the price offered is higher than what the seller has actually paid for this apartment.

Helsinki metropolitan area closer examination

Now we have the knowledge that the housing bid-ask spread follows a slightly positive trend on behalf of condominiums nationally when all the areas examined are taken into account. On behalf of all housing types the bid-ask spread and time on the market regression followed almost random walk.

On chapter three hypotheses we stated and placed in question the spread in Helsinki metropolitan area. In the hypotheses we argued that "in Helsinki metropolitan area the bid-ask spread would reflect the market liquidity". To study this question or hypothesis we constructed a multiple regression analysis to forecast the housing bid-ask spread on behalf of all housing types in Helsinki metropolitan area including cities of Espoo and Vantaa. The multiple regression analysis included the housing time on the market and the 12 month euribor interest rate.

The regression model analysis figures can be seen in appendix 7 and time on the market and 12 month Euribor scatter plot graphs are shown in figures 4 and 5.

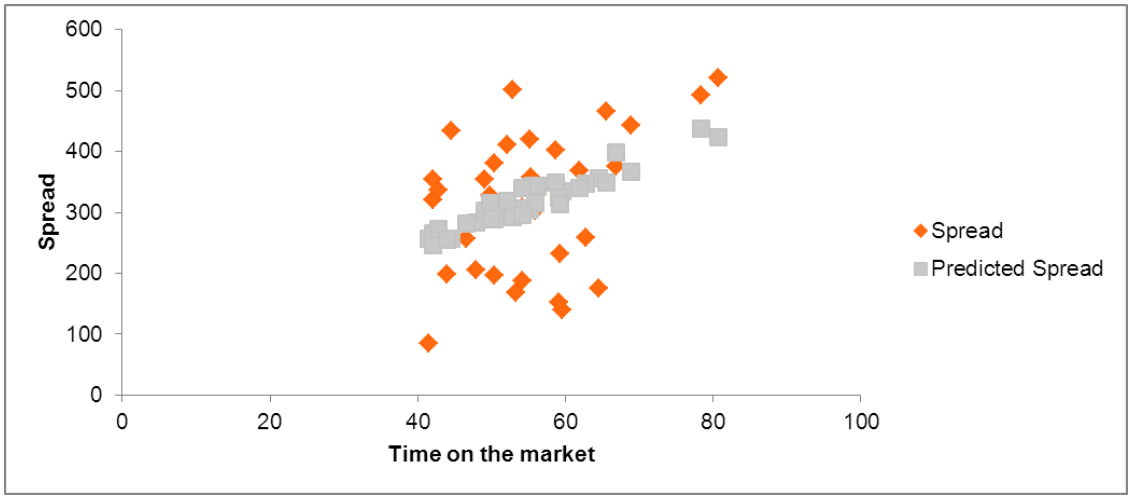


Figure 4: Scatter plot for regression between bid-ask spread and time on the market in Helsinki metropolitan area housing markets

From figure 4 we can see that dwelling time on the market affects more positively to bid-ask spread in Helsinki metropolitan area than what was seen above in nationally overall in all areas under examination. The time on the market p-value ($p\ 0.03 < 0.05$) can considered to be statistically significant. The direction of a result is somewhat what was expected but the parameter estimate or in other words the slope is not what was expected.

Because parameter estimate still is positive we can accept the third hypothesis by stating that time on the market or in other terms liquidity is reflected in the housing bid-ask spread in Helsinki metropolitan area. Because across time viewed there can be seen more extreme bids on behalf of the objects that have been on market for a long time and not spreads closer to zero we can say that the location factor is not affecting in Helsinki metropolitan area. Of course location matters inside Helsinki as we can see clearly from the scatter plot in figure 4 but the situation is not the same what it was in examination of condominiums or properties nationwide. The reason for random walk on behalf of the all housing types was that there can be properties or condominiums in good shape but in bad location considering the demand and when right buyer comes ahead the spread can be close to zero because of housing characteristics. In Helsinki metropolitan area the reason for long housing time on the market is often other factor than demand and therefore there is usually something “wrong” in housing characteristics.

In figure 5 there is seen the scatter plot of regression between housing bid-ask spread in

Helsinki metropolitan area and Euribor 12 month interest rate. The more detailed information can be found from appendix 7. Overall on the basis of appendix 7 regression output summary we can say that the interest rate factor is not as significant as the time on the market is in this regression analysis.

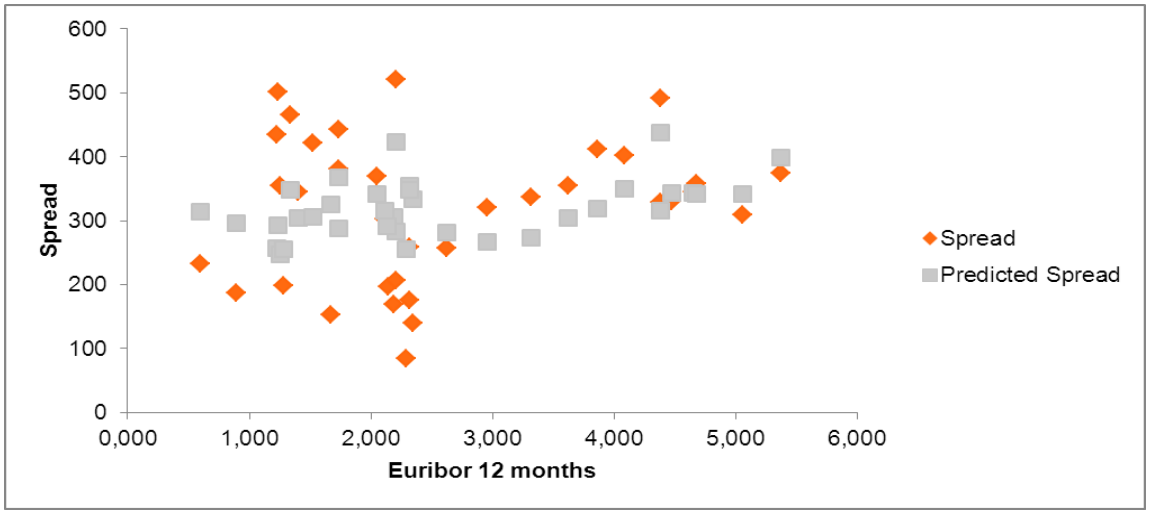


Figure 5: Scatter plot for regression between bid-ask spread in Helsinki metropolitan area housing markets and Euribor 12 month interest rate

We can say that the coefficient concerning the 12 month Euribor rate is not statistically significant (p 0.422 > 0.05). Thus from figure 5 scatter plot we can see more random bid-ask spreads when interest rate goes below 2.5 percent. For this there can be a logic explanation. The highest trading volumes in all areas in question got place in years when interest rates were considerably high. We saw previously from bid-ask spread statistical significance tests that in times when there can be observed high trading volume bid-ask spread is also widening. However in 2006-2009 the interest rates were not historically high and therefore trading volumes were boosted. In this time period when cost of search of apartment or property was considerably high measured in short term the buyers were not ready to pay higher price for their properties but instead made bid / offers far away from list prices. This kind of behavior is understandable because the apartment or property is usually one of the biggest purchases in humans' life and if one can possibly save tens of thousands in a real estate deal once or twice in a life time the savings result can finally be worth hundred thousand when we take in account also the interest rate of the investment or rather mortgage which is naturally bigger if one pays more.

Although the multiple regression model R-square and correlation figures were not statistically significant we can still state that the predicted spread is a result of the following formula:

(14) $Spread = 4.28 * time\ on\ market + 11.04 * Euribor\ 12\ month + 53.15$

The formula should be read as if the assumption for condominiums time on the market in Helsinki metropolitan area would be 30 days and 12 month Euribor rate would equal to 2.55 percent then the predicted bid-ask spread would be about 209 € per square meter. On behalf of condominium which on list price would be worth 3 000 € per square meter would sell – 6.9 percent from its list price.

8. SUMMARY AND CONCLUSIONS

The main objective of this study was to first of all answer the question of possible Finnish housing markets overvaluation from a different perspective than previous studies by studying how much the asking price differs from the bidding price in the Finnish housing markets. Secondly this study aim was in examining reflect of market liquidity to the spread between the listing and contract prices. After all this thesis results revealed how market participants in Finland have seen the pricing of housing.

Housing market data consisted of the list prices and actual contract prices of dwellings in Helsinki Metropolitan area including Espoo and Vantaa and also cities of Turku, Tampere, Oulu, Jyväskylä, Joensuu and Vaasa. The observation period was from January 1, 2005 to December 31, 2012. The statistics were quarterly price per square meter statistics and the average list and transaction prices were result from about 640.900 transactions from which condominium transactions accounted 59.3 percent. The list prices of houses were gathered from one of the biggest open market database portals in Finland and the actual contract prices were collected from Statistics Finland database. The content of both databases were based on the information of housing transactions provided by real estate agents.

In this study there was found similar results comparing to previous housing market studies made outside of Finnish housing markets. For example study results from McGreal et al. (2010) and Levin and Pryce (2007) were indicating increasing divergence of sale price away from list price during boom conditions. McGreal et al. (2010) study suggested that up-cycle involves increasing bid-ask spreads as speculative behavior drives the sale price upwards but list price is slower to react to changed market conditions. The same kind of results was obtained from bid-ask spread study part that considered the whole housing market in Finland. During years 2006-2009 when the trading volume was in its highest peak also the bid-ask spread on behalf of condominiums as well as all housing types in question rose sharply. In empirical section part of the study we concluded that we can accept the first hypothesis presented in chapter three and state that the dwelling actual transaction price is below asking price in all different market areas regardless of the type of housing.

In this study there was found also new information of the state of the Finnish housing markets and in general level we can say that there is differences in bid-ask spreads

between different housing types. One of this study targets was to clear out the fact that there would be divergence in bid-ask spread on behalf of different housing types and thus the statistical t-tests were implemented to both all housing types and condominiums in all examined areas. In general we can say that overall when taking in account the all examined market areas the buyers in Finnish housing markets have seen the list prices of houses too expensive. The percentage average difference and thus answer to this thesis main question is that across whole observation period the bid-ask spread was on behalf of all housing types – 10.3 percent and on behalf of condominiums – 12.5 percent. The answer to the first hypothesis can therefore be supplemented by saying that the bid-ask spread is in percentage more than on behalf of all housing types but it is not statistically more significant.

When studying the second hypothesis presented in chapter three stating that dwelling bid-ask spread would be larger in the areas where time on the market is longer we found slight evidence to accept the hypothesis. The result and therefore decision of whether to reject or accept the hypothesis on behalf of the time on the market affect to bid-ask spread was somewhat multidimensional. At this point we accepted the hypothesis and thus stated that the bid-ask spread is larger in the areas where time on the market is longer. This conclusion was based on the fact that the parameter estimate in all housing types was very close to zero and on behalf of the condominiums parameter estimate was somewhat more positive.

This study research result suggested also that housing markets in Helsinki metropolitan area differ from national level housing markets significantly. The amount of bid-ask spread in Helsinki metropolitan area relates to housing characteristics more than in other market areas. In other market areas the property or condominium location can be the factor that delays the sale but the transaction price can possibly be very close to zero because housing characteristics are more diverse than in Helsinki metropolitan area. Due to this fact the correlation between dwelling time on the market to housing bid-ask spread was higher in Helsinki metropolitan area accounting still quite moderately to -16.2 percent. The third hypothesis was related to question whether Helsinki metropolitan area housing would reflect the market liquidity e.g. time on the market. In the regression analysis we found evidence to accept this hypothesis.

On behalf of the regression between housing cost of search e.g. most commonly used mortgage interest reference rate 12 month euribor and housing bid-ask spread in Helsinki metropolitan area the study find somewhat similar results than the research of

Jud et al. (1995). Jud et al. (1995) found that higher mortgage rates were shown to raise the spread between the listing and contract prices. In this study implemented multiple regression models we found that the higher interest rates caused higher bid-ask spreads but there was seen no positive trend below 2.5 percent interest rate level so results were partly contradicting. As a result of this study we presented the multiple regression model that can be utilized to predict housing bid-ask spread in Helsinki metropolitan area.

In the first part of this thesis we highlighted the Deutsche Bank analyst's results that the current Finnish housing markets would be overvalued by 21 percent. As a result of this study we can also refuse this argument by stating that it is somewhat true that buyers have seen the list prices of houses too expensive e.g. they have seen housing markets as overvalued but the more detailed answer to this can be found from researches studying the transaction prices development against household incomes. As we saw in chapter 4 Kivistö (2012) research showed that household incomes in Finland have developed almost hand in hand with housing prices so as long as unemployment rate remains moderate and people can afford to buy homes or apartments there can be only the overvaluation what can be seen on behalf of the buyers towards the list prices. So the Deutsche Bank analysis has overestimated the Finnish housing markets overvaluation badly.

Throughout the entire period of the study in every research the researcher should have in mind the study validity and reliability. Also in this study there has been followed these important elements throughout the study in the implementation of the research. Of course in this as in other housing market bid-ask spread studies the question of study reliability has narrowed because of existing modern statistical programs. The measurement of error and thus the reliability is therefore pre-built into these statistical programs. As a matter of fact the same situation is also on behalf of other finance and economics related studies no matter what quantitative method was used. In this study the reliability can thus be regarded as very high as there has been used the methods that has been afforded with results from other countries as well. However, reliability can be questioned on the grounds that, for example, Lyons (2013: 35) when examining Irish housing market found almost + 4 percent bid-ask spreads in the year 2007 so the transaction price was thus higher than the list price and therefore unlike in this study was observed in the case of Finland. But as above-mentioned this study research method such as t-test as well as simple and multiple regression analysis are often used methods in economics and can thus be reproduced in any market place. However results

may differ on behalf of each investigated country according in which the transaction type in each of the examined country is valid. Is the method so-called auction method or alternatively a method in which bids are received below the declared list price? (McNeill & Chapman 2005: 9-10.)

Since this study is not the case of a qualitative research there can be assumed high validity on behalf of this study. Uncertainty or weakness in the validity may be encountered, for example, in such qualitative study in which researcher like to know the leisure habits and the targeted people would be asked; what you like to do in free time? In this case, the people's real recreational use of free time cannot be raised and thus be examined and therefore the results would be wrong. The aim of this study was to investigate the differences between housing list and transaction prices in different areas in Finland and the factors influencing the bid-ask spread development. This study was implemented in using the real list and transaction prices in certain time period. Consequently validity of the study can be regarded very high and we can say that the data collected and tested gives a true picture of the topic of study. (McNeill & Chapman 2005: 9-10.)

Among with the reliability and validity it is also necessary to disclose in this section the possible limitations of the study. The one and apparently only limitation of the study is that this research does not eliminate the so-called re-sell apartment issue. The re-sell apartment issue means that on behalf of the list prices also the apartments and houses that had withdrawn from the market during the observation period had been included to this study. Some studies like for example Kluger and Miller (1990: 4) study had censored the withdrawn apartments from their studies. The reason for ignoring these observations according to these studies is that the including these apartments to research the possibility to biased samples increases. However in this study we argue against this claim and state that it is better to use all information also on behalf of the list prices in this kind of study because by doing so the real list price development is uncovered. The withdrawn means that the broker has been too optimistic in pricing the apartment and thus it is better and more transparent to disclose also these list prices into study. Disclosing also the withdrawn apartment’s list prices thus gives better picture of the bid-ask spread.

This study has provided for the author a great deal and good results, but it does not mean that further research would not have any foothold. Hopefully, this research works as a pioneering study to future housing market bid-ask spread studies in Finland. A

natural continuation and also a favorable future research to this study would have been bid-ask spreads examination of selected apartment types. As showed in closer Helsinki metropolitan area and in condominium type study part the apartment type and studied area both affect to bid-ask spread. When studying the housing characteristics and bid-ask spreads it would be possible to distinguish between the types of apartments in where bid-ask spread is greater.

When implementing future researches it is good to have in mind that the research should stick to the Helsinki metropolitan area research. There can still be said to have so called untouched ground in Helsinki housing market examination and housing market activity may be examined in the case of the capital from many points of view. However due to lack of suitable data or difficulties on obtaining the data the other smaller areas study, closer than in this research in more detailed level is not possible. A sufficient amount of data relates to also one possible study subject what would be interesting to carry out. *Kiinteistömaailma* (2013b) has mentioned that the company has sold about 20.300 apartments and properties through so called *Tarjouskauppa* (Trade Offer) what was more detailed described in chapter 5. The bid-ask spread of these commerce sites would be interesting to investigate and to compare it to real estate deal carried out in traditional way. Time could be mature on behalf of the data to such a research.

It is a fact that in Finland there is no entity which currently would have a suitable long time period data concerning the housing markets from different also smaller areas. Housing data is in its infancy compared to, for example, the statistical power of the United States in where can be found dozens of different housing market indices from big cities to many smaller areas also. When there would be sufficient amount of data and from long enough time periods it would be interesting to study in more detailed level the so-called luxury property bid-ask spreads. Of course examination of such a subject could not be confined to the quantitative study but in addition it should be connected with the appropriate qualitative research.

REFERENCES

Abdelmonem, A., Virginia A. Clark & Susanne May (2004). Computer-Aided Multivariate Analysis. Fourth Edition. *Chapman & Hall/CRC.*

Ambrose B. V., Piet Eichholtz and Thies Lindenthal (2013). House Prices and Fundamentals: 355 Years of Evidence. *Journal of Money, Credit and Banking, Vol. 45, No. 2–3.*

Bagehot, W. (1971). The Only Game in Town. *Financial Analysts Journal. p. 12-14 & 22.*

Belkin, J., Donald J. Hempel, and Dennis W. McLeavey. (1976). An Empirical Study of Time on Market Using Multidimensional Segmentation of Housing Markets. *American Real Estate and Urban Economics Association Journal. Vol. 4. p. 57-75.*

Bourassa, S. C., Martin Hoesli, Donato Flavio Scognamiglio & Philippe Sormani (2008). Constant-quality house price indexes for Switzerland. *Research Paper Series 08-10, Swiss Finance Institute.*

Conerly, B (2012). When mortgage rates rise, will home prices fall? *Forbes. [online]. [cited 23.11.2013]*. Available from internet: < URL: http://www.forbes.com/sites/billconerly/2012/12/18/when-mortgage-rates-rise-will-home-prices-fall/ >

Einiö, M., Markku Kaustia & Vesa Puttonen (2007). Price Setting and the Reluctance to Realize Losses in Apartment Markets. *Journal of Economic Psychology Vol. 29. Issue 1. P. 19–34*

Ferrari, E. & Alasdair Rae (2011). Local housing market volatility. *Joseph Rowntree Foundation.*

Fisher, I. (1912). The Nature of Capital and Income. *New York: MacMillan Co.*

Genesove, D. & Christopher Mayer (2001). Loss aversion and seller behavior: Evidence from the housing market. *Quarterly Journal of Economics. p. 1233-1260.*

Habita (2013). Habita lyhyesti. *[online]*. *Cited 23.11.2013]*. Available from internet: <URL: http://www.habita.fi/habita-lkv/lyhyesti >

Huoneistokeskus (2013). Huoneistokeskuksen historiaa. *[online]*. *[cited 23.11.2013]*. Available from internet: < URL: http://yritys.huoneistokeskus.fi/suunnannayttaja.php >

Huoneistomarkkinointi (2013). Tietoa: Historia. *[online]*. *[cited 23.11.2013]*. Available from internet: <URL: http://www.huom.fi/tietoa/huom! >

Jud, D., Daniel Winkler & Grace Kissling (1995). Price Spreads and Residential Housing Market Liquidity. *The Journal of Real Estate Finance and Economics. Vol. 2. 251-260.*

Kammonen, T. (2012). Saksalainen tilasto näyttää: Asuntokupla Suomessa on tosi. *Uusi Suomi. [online]*. *[cited 22.11.2013]*. Available from internet: <URL: http://www.uusisuomi.fi/raha/52669-deutche-bank-suomen-asuntokupla-tosi >

Kasso, M. (2006). Näin teet asuntokaupan. *Edita Publishing Oy: Helsinki.*

Kiinteistömaailma (2013a). Tutustu Kiinteistömaailmaan: Kiinteistömaailma lyhyesti. *[online]*. *[cited 24.11.2013]*. Available from internet <URL: http://www.kiinteistomaailma.fi/tutustu-kiinteistomaailmaan >

Kiinteistömaailma (2013b). Tarjouskauppa: yleistä tästä kaupankäyntitavasta. *[online]*. *[cited 24.11.2013]*. Available from internet <URL: http://www.kiinteistomaailma.fi/tarjouskauppa >

Kivistö, J. (2012). Suomen asuntohintakehitys ja siihen vaikuttavat tekijät. *Suomen Pankki, Finlands Bank - Rahapolitiikka- ja tutkimusosasto.*

Kluger, B. D. & Norman G. Miller (1990). Measuring Residential Real Estate Liquidity. *American Real Estate and Urban Economics Association Journal. Vol. 18. p 145-159.*

Leamer, E. E. (2007). Housing IS the Business Cycle. *NBER Working Papers 13428, National Bureau of Economic Research, Inc.[online]. [cited 23.11.2013]*. Available from internet: <URL: http://ideas.repec.org/p/nbr/nberwo/13428.html >

Levin, E. J. & Gwilym B. J. Pryce. (2007). A statistical explanation for extreme bids in the house market. *Urban Studies, Vol. 44 No. 12. pp. 2339-2355.*

Lyons, R. C. (2013). Price Signals in an Illiquid Market: The Case of Residential Property in Ireland, 2006-2012. *ERES Annual Conference Vienna*.

McCarthy, J. & Peach, R. (2004). Are Home Prices the Next "Bubble"?, *FRBNY Economic Policy Review.*

McGreal, S., Louise Brown & Alastair Adair (2010). List price and sale price variation across the housing market cycle. *International Journal of Housing Markets and Analysis 3(2). p. 89-99.*

McNeill, P. & Steve Chapman (2005). Research Methods. *Third Edition. Routledge. London*

MacLennan, D. (2012). Understanding Housing Markets: Real Progress or Stalled Agendas? *The SAGE Handbook of Housing Studies, Part One: Housing Markets.*

Miller, N. G. (1978). Time on the Market and Selling Price. *American Real Estate and Urban Economics Association Journal. Vol. 6. p. 164-174.*

Munn, G. (1991). Encyclopedia of Banking and Finance. *Rolling Meadows. IL: Rankers Publishing.*

Nagaraja, C. H., Lawrence D. Brown and Susan M. Wachter (2010). House Price Index Methodology. *Journal of Real Estate Literature, Forthcoming.*

Quan, D. C. & John Quigley (1991). Price Formation and the Appraisal Function in Real Estate Markets. *Journal of Real Estate Finance and Economics. Vol. 4. p. 127-146.*

Quigley, J. M. & Björn Hårsman (1991). Housing markets and housing institutions: an international comparison. *Kluwer Academic Publishers Group.*

Rosen. S. (1974). Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy 82 (1).* p. 34-55.

Schauman, H. (2013). Tonttitarjonnan ja rakentamisen rajoittamisen yhteys asuntohintoihin. *Suomen Pankki, Finlands Bank – Rahapolitiikka- ja tutkimusosasto.*

S&P Dow Jones Indices (2013a). The S&P/Case-Shiller 10-City Composite Home Price Index. *[online]*. *[cited 23.11.2013]*. Available from internet: <URL: http://us.spindices.com/indices/real-estate/sp-case-shiller-10-city-composite-home-price-index >

S&P Dow Jones Indices (2013b). Index Methodology: S&P/Case-Shiller Home Price Indices.

Shiller, R. J. (2008). The Subprime Solution: How Today´s Global Financial Crisis Happened, and What to Do about It. *Princeton University Press.*

Statistics. (2014). In *Encyclopaedia Britannica*. *[online]*. *[cited 23.11.2013]*. <URL: http://www.britannica.com.proxy.tritonia.fi/EBchecked/topic/564172/statistics >

Statistics Finland (2013). Suomi lukuina: Väestö. *[online]*. *[cited 23.11.2013]*. Available from internet: <URL: http://www.stat.fi/tup/suoluk/suoluk_vaesto.html >

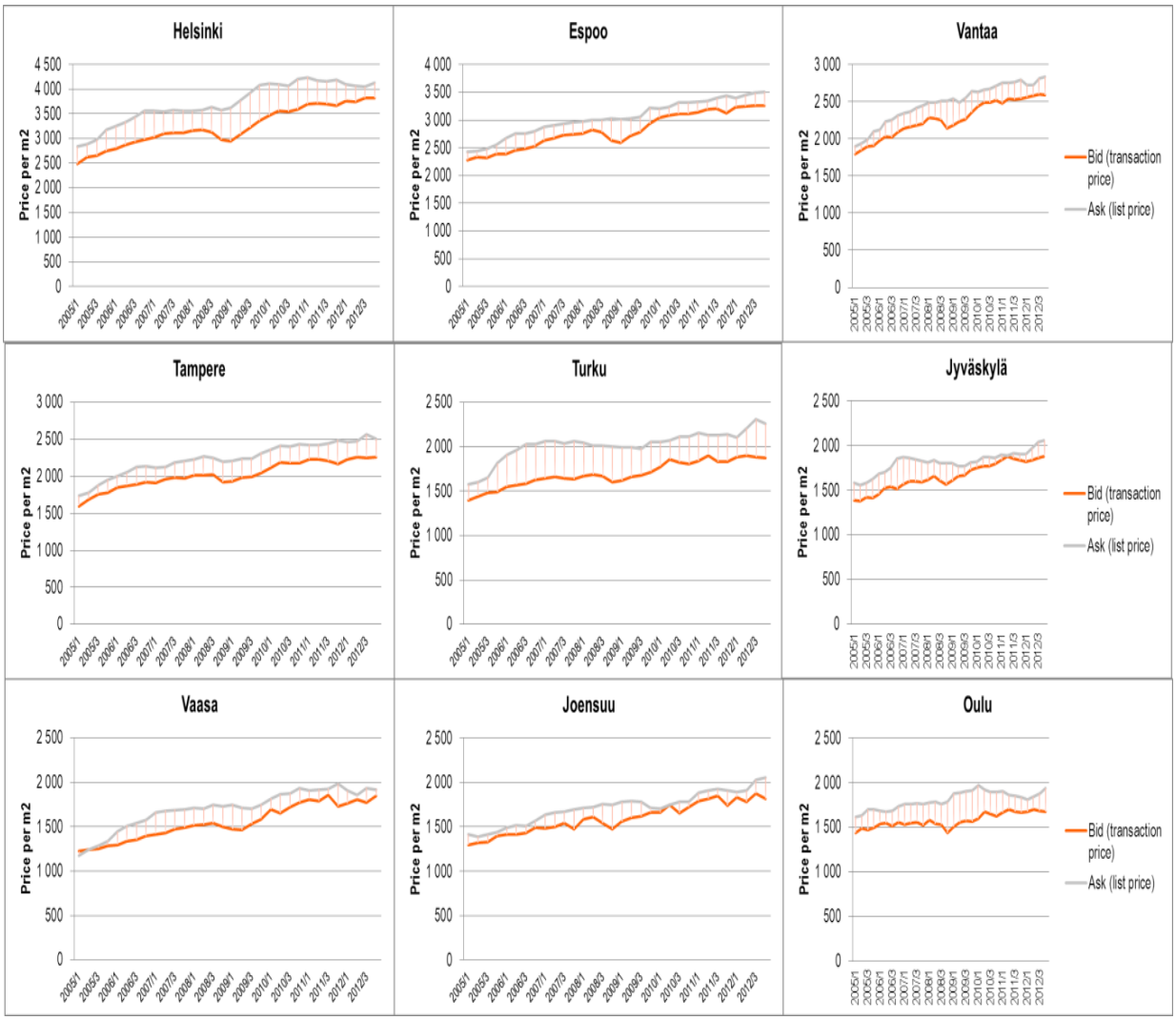
Yates, D. S., David S. Moore & Daren S. Starnes (2003). The Practice of Statistics. *New York: W.H. Freeman.*

APPENDICES

Appendix 1.

Euro-denominated bid-ask spreads in all market areas, all housing types

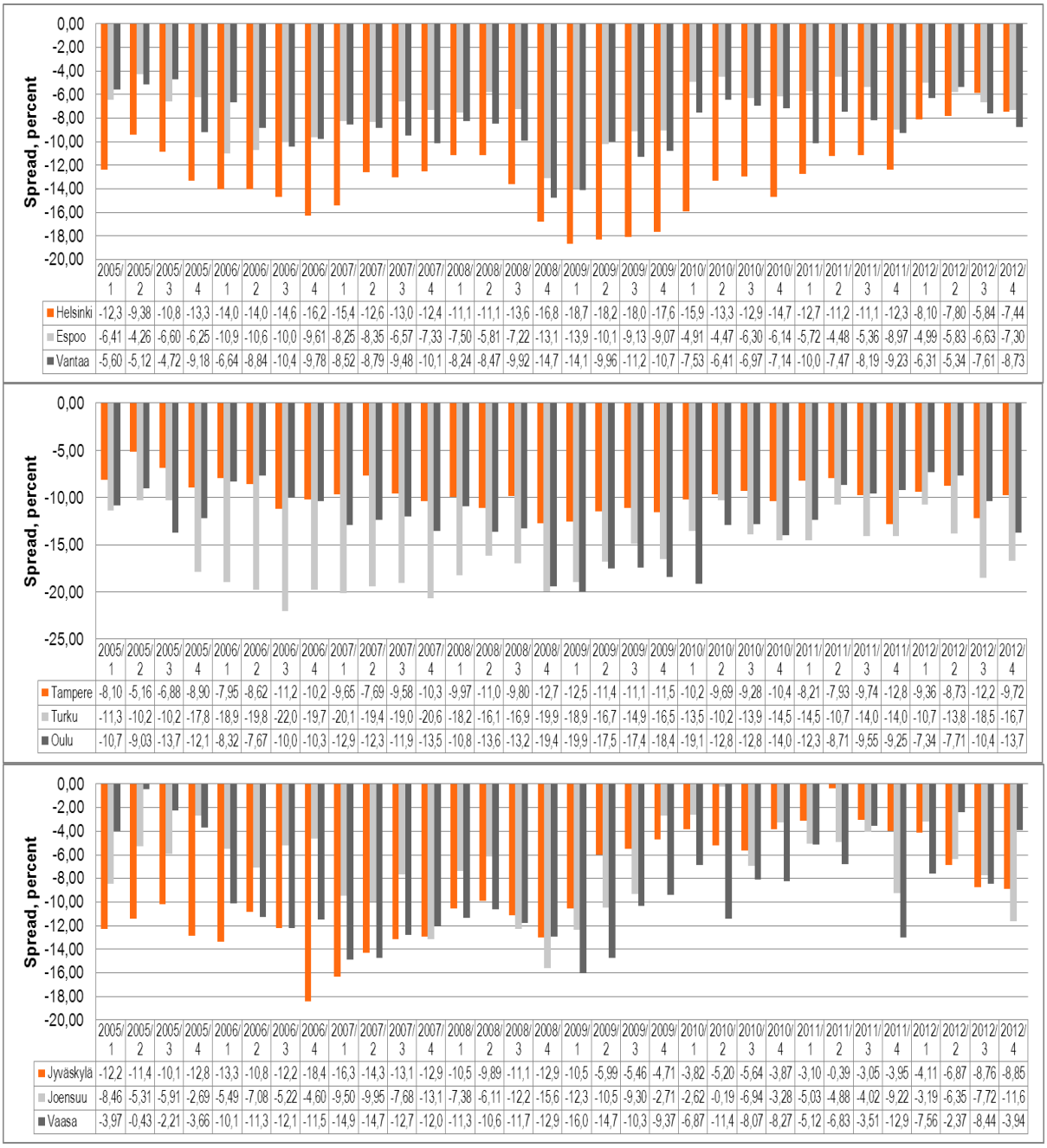
The figure presents quarterly mean list and transaction prices of all housing types in all studied market areas in the period 01/2005 – 04/2012. The first row present results on behalf of Helsinki metropolitan area including cities of Espoo and Vantaa. Second row includes figures from Tampere, Turku and Jyväskylä. The last row shows bid-ask spreads in Vaasa, Joensuu and Oulu.



Appendix 2.

Percentage bid-ask spreads in all market areas, all housing types

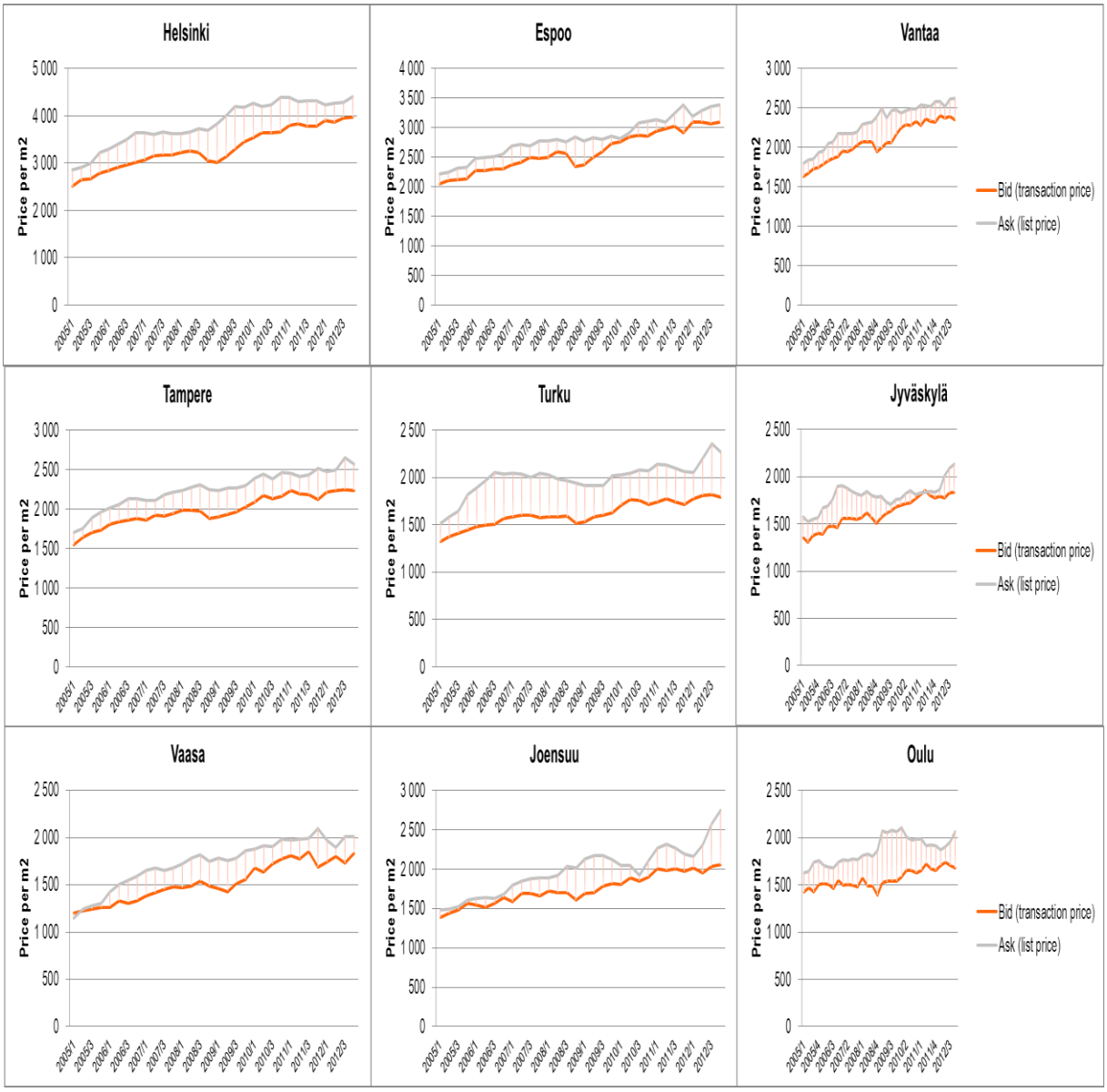
The figures presents quarterly mean percentage bid-ask spread of all housing types in all studied market areas in the period 01/2005 – 04/2012. In the figure the asking price of housing is considered to be zero so bid prices are lower in all market areas. The first row present results on behalf of Helsinki metropolitan area including cities of Espoo and Vantaa. Second row includes figures from Tampere, Turku and Oulu. The last row shows bid-ask spreads in Jyväskylä, Vaasa and Joensuu.



Appendix 3.

Euro-denominated bid-ask spreads in all market areas, condominiums

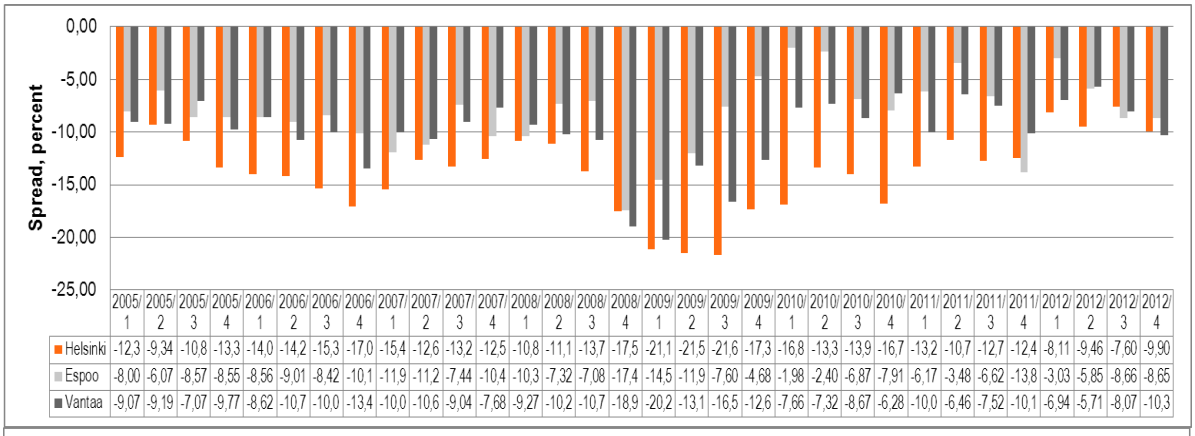
The figure presents quarterly mean list and transaction prices of condominium type houses in all studied market areas in the period 01/2005 – 04/2012. The first row present results on behalf of Helsinki metropolitan area including cities of Espoo and Vantaa. Second row includes figures from Tampere, Turku and Jyväskylä. The last row shows bid-ask spreads in Vaasa, Joensuu and Oulu.



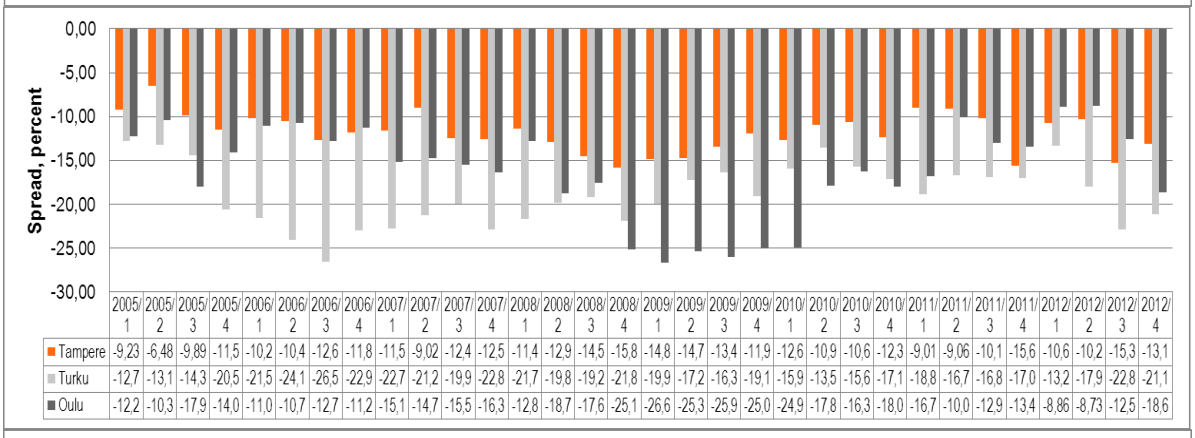
Appendix 4.

Percentage bid-ask spreads in all market areas, condominiums

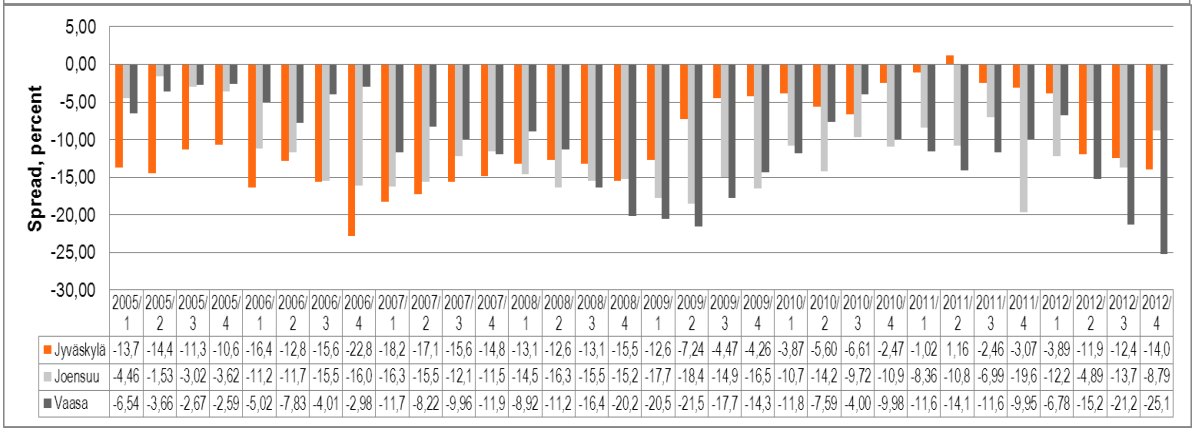
The figures presents quarterly mean percentage bid-ask spread of condominium type houses in all studied market areas in the period 01/2005 – 04/2012. In the figure the asking price of housing is considered to be zero so bid prices are lower in all market areas. The first row present results on behalf of Helsinki metropolitan area including cities of Espoo and Vantaa. Second row includes figures from Tampere, Turku and Oulu. The last row shows percentage bid-ask spreads in Jyväskylä, Vaasa and Joensuu



	2005/1	2005/2	2005/3	2005/4	2006/1	2006/2	2006/3	2006/4	2007/1	2007/2	2007/3	2007/4	2008/1	2008/2	2008/3	2008/4	2009/1	2009/2	2009/3	2009/4	2010/1	2010/2	2010/3	2010/4	2011/1	2011/2	2011/3	2011/4	2012/1	2012/2	2012/3	2012/4
Helsinki	-12,3	-9,34	-10,8	-13,3	-14,0	-14,2	-15,3	-17,0	-15,4	-12,6	-13,2	-12,5	-10,8	-11,1	-13,7	-17,5	-21,1	-21,5	-21,6	-17,3	-16,8	-13,3	-13,9	-16,7	-13,2	-10,7	-12,7	-12,4	-8,11	-9,46	-7,60	-9,90
Espoo	-8,00	-6,07	-8,57	-8,55	-8,56	-9,01	-8,42	-10,1	-11,9	-11,2	-7,44	-10,4	-10,3	-7,32	-7,08	-17,4	-14,5	-11,9	-7,60	-4,68	-1,98	-2,40	-6,87	-7,91	-6,17	-3,48	-6,62	-13,8	-3,03	-5,85	-8,66	-8,65
Vantaa	-9,07	-9,19	-7,07	-9,77	-8,62	-10,7	-10,0	-13,4	-10,0	-10,6	-9,04	-7,68	-9,27	-10,2	-10,7	-18,9	-20,2	-13,1	-16,5	-12,6	-7,66	-7,32	-8,67	-6,28	-10,0	-6,46	-7,52	-10,1	-6,94	-5,71	-8,07	-10,3



	2005/1	2005/2	2005/3	2005/4	2006/1	2006/2	2006/3	2006/4	2007/1	2007/2	2007/3	2007/4	2008/1	2008/2	2008/3	2008/4	2009/1	2009/2	2009/3	2009/4	2010/1	2010/2	2010/3	2010/4	2011/1	2011/2	2011/3	2011/4	2012/1	2012/2	2012/3	2012/4
Tampere	-9,23	-6,48	-9,89	-11,5	-10,2	-10,4	-12,6	-11,8	-11,5	-9,02	-12,4	-12,5	-11,4	-12,9	-14,5	-15,8	-14,8	-14,7	-13,4	-11,9	-12,6	-10,9	-10,6	-12,3	-9,01	-9,06	-10,1	-15,6	-10,6	-10,2	-15,3	-13,1
Turku	-12,7	-13,1	-14,3	-20,5	-21,5	-24,1	-26,5	-22,9	-22,7	-21,2	-19,9	-22,8	-21,7	-19,8	-19,2	-21,8	-19,9	-17,2	-16,3	-19,1	-15,9	-13,5	-15,6	-17,1	-18,8	-16,7	-16,8	-17,0	-13,2	-17,9	-22,8	-21,1
Oulu	-12,2	-10,3	-17,9	-14,0	-11,0	-10,7	-12,7	-11,2	-15,1	-14,7	-15,5	-16,3	-12,8	-18,7	-17,6	-25,1	-26,6	-25,3	-25,9	-25,0	-24,9	-17,8	-16,3	-18,0	-16,7	-10,0	-12,9	-13,4	-8,86	-8,73	-12,5	-18,6



	2005/1	2005/2	2005/3	2005/4	2006/1	2006/2	2006/3	2006/4	2007/1	2007/2	2007/3	2007/4	2008/1	2008/2	2008/3	2008/4	2009/1	2009/2	2009/3	2009/4	2010/1	2010/2	2010/3	2010/4	2011/1	2011/2	2011/3	2011/4	2012/1	2012/2	2012/3	2012/4
Jyväskylä	-13,7	-14,4	-11,3	-10,6	-16,4	-12,8	-15,6	-22,8	-18,2	-17,1	-15,6	-14,8	-13,1	-12,6	-13,1	-15,5	-12,6	-7,24	-4,47	-4,26	-3,87	-5,60	-6,61	-2,47	-1,02	1,16	-2,46	-3,07	-3,89	-11,9	-12,4	-14,0
Joensuu	-4,46	-1,53	-3,02	-3,62	-11,2	-11,7	-15,5	-16,0	-16,3	-15,5	-12,1	-11,5	-14,5	-16,3	-15,5	-15,2	-17,7	-18,4	-14,9	-16,5	-10,7	-14,2	-9,72	-10,9	-8,36	-10,8	-6,99	-19,6	-12,2	-4,89	-13,7	-8,79
Vaasa	-6,54	-3,66	-2,67	-2,59	-5,02	-7,83	-4,01	-2,98	-11,7	-8,22	-9,96	-11,9	-8,92	-11,2	-16,4	-20,2	-20,5	-21,5	-17,7	-14,3	-11,8	-7,59	-4,00	-9,98	-11,6	-14,1	-11,6	-9,95	-6,78	-15,2	-21,2	-25,1

Appendix 5.

Regression analysis for bid-ask spread and the time on the market in all housing types

The table presents OLS regression results where the regressor is time on the market and regressand is all housing types euro-denominated bid-ask spread.

Regression model figures	
R-square	0,046
Correlation	0,002
Standard Error	129,030
Number of Observations	288

ANOVA

	df	*Sum of Squares*	*Mean Square*	*F*	*Pr > F*
Model	1	10183,657	10183,657	0,612	0,435
Error	286	4761526,840	16648,695		
Corrected Total	287	4771710,497			

	Parameter Estimat	*Standard Error*	*t value*	*P-value*	*Lowest 95%*	*Highest 95%*
Intercept	263,622	33,393	7,895	0,000	197,894	329,349
Time on the market	-0,391	0,500	-0,782	0,435	-1,376	0,594

Appendix 6.

Regression analysis for bid-ask spread and the time on the market in condominiums

The table presents OLS regression results where the regressor is time on the market and regressand is condominium type housing euro-denominated bid-ask spread.

Regression model figures	
R-Square	0,178
Correlation	0,032
Standard Error	147,599
Number of Observations	288

ANOVA

	df	*Sum of Squares*	*Mean Squares*	*F Value*	*Pr > F*
Model	1	203535,103	203535,103	9,343	0,002
Error	286	6230677,227	21785,585		
Corrected Total	287	6434212,330			

	Parameter Estimate	*Standard Error*	*t-value*	*p-value*	*Lowest 95%*	*Highest 95%*
Intercept	196,645	30,920	6,360	0,000	135,786	257,504
Time on the market	1,537	0,503	3,057	0,002	0,547	2,527

Appendix 7.

Multiple regression analysis for bid-ask spread on the time on the market and Euribor 12 months in all housing types in Helsinki metropolitan area

The table presents OLS regression results where the regressors are Euribor 12 months interest rate and time on the market together with regressand that is all housing types euro-denominated bid-ask spread in Helsinki metropolitan area including cities of Espoo and Vantaa.

Regression model figures	
R-square	0,403
Correlation	0,162
Standard Error	104,374
Number of observations	36

ANOVA

	df	*Sum of Squares*	*Mean Squares*	*F-value*	*Pr > F*
Model	2	69507,243	34753,621	3,190	0,054
Residual	33	359496,564	10893,835		
Total	35	429003,807			

	Parameter estima	*Standard error*	*t-test*	*p-value*	*Lowest 95%*	*Highest 95%*
Intercept	53,148	107,226	0,496	0,623	-165,005	271,302
Time on the market	4,284	1,895	2,260	0,031	0,428	8,140
Euribor 12 months	11,043	13,594	0,812	0,422	-16,614	38,700